BRITISH MUSEUM
(NATURAL HISTORY)

THE FAMILIES AND GENERA OF LIVING RODENTS

BY
J. R. ELLERMAN

WITH A LIST OF NAMED FORMS (1758–1936)
BY
R. W. HAYMAN and G. W. C. HOLT

VOLUME II. FAMILY MURIDAE

LONDON:
PRINTED BY ORDER OF THE TRUSTEES
OF THE BRITISH MUSEUM

Issued 21st March, 1941] [*Price One Pound Fifteen Shillings*

Sold at THE BRITISH MUSEUM (NATURAL HISTORY), CROMWELL ROAD, S.W.7,
and by
B. QUARITCH, LTD.; DULAU & CO., LTD.;
and the OXFORD UNIVERSITY PRESS

MADE AND PRINTED IN GREAT BRITAIN
BY JARROLD AND SONS LTD. NORWICH

CONTENTS

LIST OF TEXT-FIGURES

(With the exception of Figs. 9, 12, 16, and 25, from Miller's *Catalogue of the Mammals of Western Europe*, and Figs. 36–38, and 41 from Hinton's *Monograph of Voles and Lemmings*, by the same artist, all the figures have been specially drawn for this volume by Mr. A. J. Engel Terzi.)

Family MURIDAE

1896. Thomas: Muridae (included *Lophiomys*). Subfamilies Hydromyinae, Rhynchomyinae, Phloeomyinae, Gerbillinae, Murinae, Dendromyinae, Otomyinae, Cricetinae, Neotominae, Microtinae, "Siphneinae" = Myospalacinae. Spalacidae, part, Rhizomyinae, part (*Tachyoryctes*).
1899. Tullberg: Families Spalacidae, part (*Myospalax* and *Tachyoryctes*); Nesomyidae; Cricetidae; Arvicolidae; Hesperomyidae; Muridae (with subfamilies Murini, Phloeomyini, Otomyini); Gerbillidae.
1918. Miller & Gidley: Family Cricetidae (with subfamilies Cricetinae, Gerbillinae, Microtinae (and included Lophiomyinae)); Family Rhizomyidae, part, subfamily Tachyoryctinae; Family Spalacidae, part, subfamily Myospalacinae; Family Muridae (with subfamilies Dendromyinae, Murinae, Phloeomyinae, Otomyinae, Hydromyinae).
1924. Winge: Family Muridae, part; subfamilies Rhizomyini (*Rhizomys*, *Tachyoryctes*, and genera from Madagascar); Cricetini (with groups Criceti (included *Lophiomys*), Hesperomyes, and Arvicolae); and Murini, with groups Mures, Gerbilli, and Hydromyes.
1928. Weber: Family Spalacidae (part, *Tachyoryctes*, *Myospalax*); Family Nesomyidae; Family Muridae (with subfamilies Cricetinae, Microtinae, Murinae, Gerbillinae, Hydromyinae (and included Lophiomyinae)).

Geographical Distribution.—Throughout the Holarctic, Indo-Malayan, Australasian, African and Neotropical regions, from Arctic regions of Eurasia south to the Cape of Good Hope, and Tasmania; east to Fiji and other islands of the Pacific; Madagascar; and in the New World from Arctic regions including Greenland south to Tierra del Fuego, and including the Galapagos Islands.

Number of Genera.—I have examined and retained one hundred and eighty-six genera, divided among twelve subfamilies. At least six, and perhaps more, valid genera are not represented in the British Museum.

(In the first volume, containing all other Rodents, one hundred and forty-seven genera were retained, and four besides these are not represented in London.)

The Family Muridae belongs according to the present classification to the Superfamily Muroidae, a group containing also four families, Muscardinidae, Lophiomyidae, Rhizomyidae, and Spalacidae, which have been dealt with in the first volume. A key to these families has already been given.

Notes on the essential characters of the family Muridae have also been given in Volume I. For reference purposes, these are repeated here.

Characters.—Zygomasseteric structure primitively (*Deomys*), nearly as in Sicistinae (Dipodidae), except that the infraorbital foramen is more generalized, less enlarged, and not conspicuously wider below than above. In all remaining genera the zygomatic plate is broadened and tilted upwards to a greater or lesser degree; masseter lateralis extends its line of attachment on to zygomatic plate, and masseter lateralis superficialis has its anterior head distinct, so far as known, from the zygoma. Infraorbital foramen always transmitting muscle; but never extremely enlarged; usually or always less so than in such superfamilies as Anomaluroidae, Ctenodactyloidae, Pedetoidae, and Dipodoidae. Mandible with angular portion not distorted outwards by masseter muscle.

Skull usually with constricted frontals; auditory bullae in the majority not much enlarged, but may become so (Gerbillinae); or may be much reduced, as in *Phloeomys*, etc. Jugal typically considerably shortened; but long in *Tachyoryctes* and others.

Dental formula in the majority i. $\frac{1}{1}$, c. $\frac{0}{0}$, p. $\frac{0}{0}$, m. $\frac{3}{3}=16$. In some forms the cheekteeth are reduced to $\frac{2}{2}$ (*Rhynchomys*, and some Hydromyine genera). In one genus, *Desmodilliscus*, the cheekteeth formula is $\frac{3}{2}$. Molars rooted except in *Myospalax*, *Rhombomys*, and the majority of the Microtinae.

Fibula, so far as known, reduced and fused high on the leg with the tibia. Digits of hindfoot five, with the one exception of *Malacothrix*, in which they are reduced to four. In a few African genera, the forefoot may have three functional digits, or three digits only.

External form as a rule small and generalized; sometimes much modified for underground life (*Myospalax*, *Ellobius*, *Prometheomys*, *Notiomys*, etc.); sometimes highly specialized for aquatic life: cranially as well as externally in *Ichthyomys* and allies, *Hydromys*, *Crossomys*; externally in *Ondatra*, etc. In some forms, hindfoot extremely specialized for arboreal life; a fully opposable and clawless hallux is developed in *Hapalomys*, *Chiropodomys*, *Vandeleuria*, *Chiromyscus*. In one case, *Notomys*, and possibly in some Gerbillinae, apparently specialized for bipedal saltatorial life. Spiny covering may be developed (*Acomys*, some species of *Rattus*, etc.), but is never comparable to that of specialized Hystricoid Rodents. Tail typically naked and scaly; uniformly haired in *Crateromys*, one species of *Neotoma*, most Gerbillinae, and others.

Infraorbital foramen typically specialized into a wider upper portion for muscle-transmission and a narrower lower one for nerve transmission, its lower border very generally V-shaped, and not straight (compare Rhizomyidae). Cheekteeth laminate, cuspidate, or prismatic, but never agreeing in pattern with that of Muscardinidae (i.e., not basin-shaped with weak transverse ridges and corner cusps, nor flatcrowned with a series of raised narrow transverse ridges extending across crown). External form various, but when subfossorial, eyes retained, and zygomatic plate not specially narrowed and turned downwards (compare Spalacidae). Temporal fossae never roofed in by bony outgrowths (compare Lophiomyidae). Masseter muscle, so far as known, not rising beside infraorbital foramen on its inner side (compare Rhizomyidae).

In this group I recognize twelve subfamilies. The Lophiomyidae, Spalacidae, and Rhizomyidae are probably offshoots of the present family, and are too highly specialized to be included. The Muscardinidae seem to stand very near the Muridae, but to be more primitive than Muridae; that family I regard as fundamentally the most generalized of living Rodents except Aplodontiidae and perhaps Bathyergidae.

With reference to the cheekteeth formula of Muridae, I must note that according to some authors, the three cheekteeth represent P.4, M.1, and M.2, and it is suggested that M.3 is suppressed. There seems to be considerable evidence in favour of this view[1]; but for convenience throughout this work I adopt the customary notation.

THE RATS FROM MADAGASCAR

There are six genera that I have examined, containing seven well-marked species in all, from Madagascar. They are excessively difficult to classify. Most authors have referred them to a subfamily Nesomyinae, whose sole character seems to be "Habitat in Madagascar," or dumped them all in the subfamily Cricetinae. It does not seem to me possible to take either course.

The sole character given by Tullberg for the group which is unusual among the Muridae he examined is the fact that the tongue possesses three papillae circumvallatae, but he only examined two genera, *Gymnuromys* and *Eliurus*. But this character, although in most other Muridae he examined was reduced to one, was present in *Cricetomys* (three); while two were present in *Myospalax* and *Tachyoryctes*. It is not a character which one can use throughout the Order; and is apparently variable in closely allied genera in other groups (for instance, *Petaurista*, 0, *Pteromys*, 3, in the *Pteromys* group of Sciuridae). It is probably merely a primitive character which may be met with in any group.

The Rats of Madagascar may be arranged as follows, in key form.

Skull specialized, Microtine in aspect, with zygomatic plate strongly tilted upwards, infraorbital foramen small, and temporal ridges fusing to form a median interorbital ridge. Cheekteeth prismatic, but brachyodont. BRACHYTARSOMYS

Skull without the specializations just described.

Cheekteeth laminate, a series of transverse plates, these plates equal-sized, pressed closely together, the general effect simple. M.3 slightly larger than M.2, and M.2 equal in elements to M.1. ELIURUS

Cheekteeth never a series of plain transverse plates.

Cheekteeth flatcrowned, the folds of the molars becoming isolated on crown surface as long thick transverse enamel ridges which extend across crown, and in progressive forms cease to appear as re-entrant folds, being completely isolated. Folds much curved. BRACHYUROMYS

This specialization at highest development, M.3 larger. *Brachyuromys ramirohitra*

This specialization usually not reached until old age. M.3 smaller. *Brachyuromys betsileoensis*

[1] For a full discussion see Hinton, Ann. Mag. Nat. Hist. 9, XI, p. 162, 1923.

Cheekteeth without the pattern just described.

Cheekteeth completely flatcrowned, the laminae excessively tightly pressed together and compressed; all traces of cusps obliterated; the pattern a series of extremely narrow line-like folds isolated, or nearly so, on crown surface. M.3 is broader and a little longer than M.2, and M.2 is slightly larger than M.1. GYMNUROMYS

Cheekteeth without the pattern just described.

Cheekteeth hypsodont, prismatic in appearance, with inner and outer re-entrant folds present, but no signs of cusps, the general effect simple. HYPOGEOMYS

Cheekteeth brachyodont, not prismatic, excessively complex, with clear cusps, these arranged biserially; outer main folds of upper molars with subsidiary ridges present (or elements apparently corresponding to them). NESOMYS

Of these genera, *Hypogeomys* has many noticeable external specializations, but the external form of the others, though the size is usually relatively large, is generalized.

A feature in which these Rats differ from normal Muridae is the very general fact that M.2 is scarcely smaller than M.1, and M.3 is often as large as, or larger than, M.2.

Winge referred them all to his Rhizomyini (also containing *Tachyoryctes*), on this character (M.2 scarcely smaller than M.1), whereas in his Murini and Cricetini (containing the rest of the family), M.2 is "clearly smallei than M.1."

But unfortunately, though very generally so, this is not always the case, as for instance *Anisomys* in Murinae, and some American Cricetine genera, which have the elements of M.2 exactly as in M.1.

The cranial peculiarities of *Brachytarsomys* are very similar to those of the Microtinae, except the much less specialized posterior portion of the palate. The molais also are Microtine in aspect, so that Hinton has suggested that this genus will perhaps have to be transferred from the "Nesomyinae" to the Microtinae. It further differs from Microtinae in the brachyodont molars. But the pattern of the cheekteeth, and the specialized Microtine skull (with fused interorbital crest, and weak squamosal crest), occurring together are very significant, and the genus is here regarded as a primitive Microtine.

Brachyuromys resembles *Tachyoryctes* closely in dental pattern, as long ago was pointed out by Forsyth Major. It differs markedly in dental characters from any Cricetine seen. *B. betsileoensis* is less specialized, though probably to be considered as a near ally or forerunner of typical *Brachyuromys*. The folds are not quite entirely isolated, and are usually separated by a space in the middle of the tooth. The pattern, particularly of M.2, is not altogether unlike that of *Sigmodon*, among Neotropical Cricetinae. I am uncertain of the status of this form, which should probably form a distinct genus. There is not the slightest doubt in my mind that *Tachyoryctes* is a member of the Muridae, and that typical *Brachyuromys* on account of its dental pattern probably stands very close to it, although the pattern might have been derived independently.

From Cricetinae with a similar pattern, *B. betsileoensis* differs in the more reduced M.1, just as does *Nesomys* from the *Oryzomys* group of Cricetine genera.

Nesomys is the most primitive genus from Madagascar dentally. The cusps are developed as in, and the general pattern is similar to the very complex-toothed Neotropical Cricetinae like *Oryzomys*, differing, however, in at least two very important characters; M.2 is similar in elements to M.1 in *Nesomys*, more reduced than M.1 in elements in *Oryzomys*; and M.1 in *Nesomys* has the anterointernal corner evenly rounded, and apparently lacking all traces of the anterointernal cusp, which is always conspicuous in *Oryzomys* and allies.

Hypogeomys is also similar to Cricetine genera, but right at the other end of the series; being most like *Neotoma* or that section of Cricetinae in dental characters; a highly specialized hypsodont more or less prismatic dentition, with inner and outer folds (in *Hypogeomys* narrow, and not well open), and all traces of cusps obliterated. The pattern is more or less similar in all upper teeth, but M.3 is a little reduced. It differs from *Neotoma* and prismatic Cricetinae in the suppression of the anterointernal fold of M.1, in this character (reduction of anterointernal side of M.1), differing from *Neotoma* just as *Nesomys* differs from *Oryzomys*. The pattern is not as "Microtine" as in *Neotoma*, but is compared with that genus because it seems to be more near it than to any of the others.

Gymnuromys is probably a derivative of *Nesomys*. But it is extremely highly modified dentally, differing in general dental effect from all other Muridae, and indeed from all Rodents examined. The general ridge-plan is similar to that of *Nesomys*, and also as I have noted seems to have some similarity to that of the Dormouse *Platacanthomys*, though the dental effect of all three genera is very different.

Eliurus is running parallel to the most highly specialized Murinae (*Phloeomys*, etc.). The cheekteeth are, apparently from birth, a series of absolutely transverse plates. This is the most simplified pattern known among the Rats of Madagascar. The plates are pressed together (though nothing like so tightly as those of *Gymnuromys*), and further differ from those of *Gymnuromys* in being straight instead of considerably curved. It differs from Murinae in the character usual to these Madagascar genera, namely, M.2 is not reduced in elements; and here, as in *Gymnuromys* and others, M.3 tends to be slightly larger than M.2. There is, however, no tendency towards reduplication of elements such as is found in Otomyinae, another group with the molars a series of transverse plates.

These Rats must have been isolated very early in Madagascar—perhaps before the various subfamilies of Murinae as we now accept them were fully differentiated. Free from competition, they retain many primitive characters such as are not usually met with elsewhere in Muridae; yet they parallel different groups of Muridae in essential development. The key I have listed above shows that there are no characters which will hold this group together as a subfamily, and that they are strongly differentiated. (Apart from the primitive character of a relatively long jugal, which may be met with anywhere independently within the Muridae, their cranial characters are not peculiar, and certainly will not divide them from other Muridae.)

I have therefore no alternative but to refer them to different subfamilies.

Brachytarsomys is regarded as a primitive Microtine; *Brachyuromys* is referred to the Tachyoryctinae; *Gymnuromys* must, I think, be retained apart from all other Muridae as type of a special subfamily; *Nesomys* is a primitive member of the Cricetinae, and *Hypogeomys* is one of the most highly specialized Cricetinae known; *Eliurus* I refer to the Murinae, though it is not closely allied to other Murinae. It is curious that *Eliurus*, which is the most specialized dentally of all Madagascar Rats, according to the theories held here, should be referred to the Murinae, which are regarded as dentally the lowest subfamily in the group. The specialization reached by *Eliurus* is in essential pattern as high as the most specialized dental type known in Murinae, *Phloeomys*; but the proportions of the teeth are more primitive than in any known Murine except perhaps *Anisomys*.

Key to the Subfamilies of Muridae

Zygomatic plate completely beneath the infraorbital foramen. Subfamily DEOMYINAE (*Deomys*)

Zygomatic plate tilted upwards to a greater or lesser degree.

Cheekteeth prismatic in pattern, frequently evergrowing. Skull much specialized, either for underground life, or by ridges for attachment of jaw muscles.

Zygomatic plate not tilted strongly upwards; infraorbital foramen large; lambdoid crest slanting forwards to posterior zygomatic root. (External form is much specialized for underground life; cheekteeth evergrowing.) Subfamily MYOSPALACINAE (*Myospalax*)

Zygomatic plate tilted very strongly upwards; infraorbital foramen small, narrowed and reduced; lambdoid crest not slanting forwards to level of posterior zygomatic root. (The skull is profoundly modified by ridges for jaw-muscle attachment, with tendency to develop median interorbital crest, squamosal crests, etc.) Subfamily MICROTINAE

Cheekteeth brachyodont; third lower molar not reaching down to level of incisors. Group Brachytarsomyes (*Brachytarsomys*)

Cheekteeth strongly hypsodont; third lower molar always reaching down to level of incisors.

Lower incisor short, lingual to molars. Group Lemmi (*Dicrostonyx, Synaptomys, Myopus, Lemmus*)

Lower incisor long, passing from lingual to labial side of molars between bases or roots of M.2 and M.3. Group Microti
(*Clethrionomys*, *Aschizomys*, *Eothenomys*, *Anteliomys*, *Alticola*, *Hyperacrius*, *Dolomys*, *Phenacomys*, *Arvicola*, *Phaiomys*, *Blanfordimys*, *Pitymys*, *Neodon*, *Pedomys*, *Proedromys*, *Orthriomys*, *Herpetomys*, *Microtus*, *Lasiopodomys*, *Lagurus*, *Ondatra*, *Neofiber*, *Prometheomys*, *Ellobius*)

Cheekteeth various, but with one exception (out of over a hundred and fifty genera), not evergrowing; when prismatic the skull is not much specialized by ridges for jaw-muscle attachment, as described above, nor for underground life.

Upper incisors vestigial. Cheekteeth so reduced as to be almost invisible to the naked eye. Subfamily RHYNCHOMYINAE
(*Rhynchomys*)

Upper incisors and cheekteeth never excessively reduced.

Skull specialized, with tendency to great inflation of auditory bullae, enlargement of braincase, and weakening of rostrum, its general type suggestive of that found elsewhere in bipedal saltatorial Rodentia, such as Dipodidae, or Heteromyidae. Limbs with tendency towards lengthening; external form always specialized for life in plains or desert regions. (In one genus, molars evergrowing; the cheekteeth are primitively with cusps arranged biserially in the upper series, progressively becoming a series of laminae separated by relatively wide inner and outer re-entrant folds, the folds approximately opposite and equal, the general effect simple.) Subfamily GERBILLINAE
(*Tatera*, *Taterillus*, *Gerbillus*, *Microdillus*, *Desmodillus*, *Desmodilliscus*, *Pachyuromys*, *Ammodillus*; *Meriones*, *Psammomys*, *Brachiones*, *Rhombomys*)

Skull never specialized as just described, with less tendency to inflation of bullae, etc. (In most forms the skull is relatively generalized.)

Cheekteeth a series of transverse plates; M.3 becoming the dominant tooth, always larger than M.2, usually larger than M.1, and with reduplication of elements.
Subfamily OTOMYINAE
(*Otomys*, *Parotomys*)

Cheekteeth when a series of transverse plates never with M.3 the dominant tooth. M.3 without reduplication of elements.

Cheekteeth completely flatcrowned, the laminae excessively tightly packed together and compressed, the pattern a series of extremely narrow line-like folds isolated, or nearly so, on crown surface. M.3 is broader and a little longer than M.2, and M.2 is slightly larger than M.1.

Subfamily GYMNUROMYINAE (*Gymnuromys*)

Cheekteeth never with the pattern just described.

Cheekteeth with the re-entrant folds isolating to form extremely thick parallel curved ridges extending across flat crowns; the general effect in elements considerably simplified in fully adult. Subfamily TACHYORYCTINAE

Skull much specialized for fossorial life. Jugal tending to extend to the lachrymal. Group Tachyoryctae (*Tachyoryctes*)

Skull generalized. Jugal long, but not extending to lachrymal. Group Brachyuromyes (*Brachyuromys*)

Cheekteeth with re-entrant folds not isolating to form thick parallel ridges; when isolating, the elements not reduced, and the general pattern more complex, and the isolation of the folds less complete.

Cheekteeth cuspidate, laminate or prismatic; when cuspidate, the cusps of the upper molars arranged in two longitudinal rows; and the laminae bearing the cusps separated by wide folds. (When prismatic, skull not specially modified, compare Microtinae.)

Subfamily CRICETINAE

(*Oryzomys*, *Megalomys*, *Neacomys*, *Nectomys*, *Rhipidomys*, *Thomasomys*, *Phaenomys*, *Chilomys*, *Tylomys*, *Ototylomys*, *Nyctomys*, *Otonyctomys* (the last not seen), *Nesomys*, *Rhagomys*, *Reithrodontomys*, *Peromyscus*, *Baiomys*, *Calomyscus*, *Onychomys*, *Akodon*, *Zygodontomys*, *Microxus*, *Lenoxus*, *Oxymycterus*, *Blarinomys*, *Notiomys*, *Scapteromys*, *Scotinomys*, *Cricetulus*, *Cricetus*, *Phodopus*, *Mesocricetus*, *Mystromys*, *Hesperomys*, *Eligmodontia*, *Graomys*, *Phyllotis*, *Chinchillula*, *Irenomys*, *Reithrodon*, *Neotomys*, *Euneomys*, *Chelemyscus*, *Sigmomys*, *Sigmodon*, *Holochilus*, *Andinomys*, *Neotomodon*, *Teanopus* (the last not seen), *Neotoma*, *Hodomys*, *Xenomys* (the last not seen); *Nelsonia*, *Hypogeomys*, *Rheomys*, *Ichthyomys*, *Anotomys*)

Cheekteeth cuspidate or laminate; when cuspidate the cusps of the upper molars are arranged in three longitudinal rows; the laminae bearing the cusps are pressed together, not separated by wide folds.

Cheekteeth simplified, more or less basinshaped (probably derived from triserial pattern with the outer row of the upper molars suppressed); M.$\frac{3}{3}$ absent or vestigial. Subfamily HYDROMYINAE

(*Xeromys*, *Leptomys*, *Chrotomys*, *Celaenomys*, *Pseudohydromys* (the last not seen); *Parahydromys*, *Hydromys*, *Crossomys*)

Cheekteeth less simplified, and not obviously basinshaped. M.$\frac{3}{3}$ present.

Inner row of cusps of the upper molars much reduced, so that there is only one functional inner cusp in first and second upper molars. M.$\frac{3}{3}$ strongly reduced. Subfamily DENDROMYINAE

(*Steatomys*, *Dendromus*, *Malacothrix*; *Prionomys*; *Petromyscus*)

Inner row of cusps of the upper molars not specially reduced, so that there is more than one functional cusp in the first and second upper molars. Subfamily MURINAE

M.2 similar in size and elements to M.1.

Lower incisors normal; M.3 rather larger than M.2 Group Eliuri

(*Eliurus*)

Lower incisors extremely compressed, and highly specialized; M.3 smaller than M.2. Group Anisomyes

(*Anisomys*)

M.2 is more reduced in elements than M.1. Group Mures

(*Hapalomys*, *Pogonomys*, *Chiropodomys*, *Vandeleuria*, *Lenomys*, *Micromys*, *Apodemus*, *Thamnomys*, *Grammomys*, *Carpomys*, *Batomys*, *Crateromys*, *Pithecheir*, *Mallomys*, *Hyomys*, *Conilurus*, *Zyzomys*, *Laomys*, *Mesembriomys*; *Oenomys*, *Mylomys*, *Dasymys*, *Arvicanthis*, *Pelomys*, *Rhabdomys*, *Lemniscomys*, *Hybomys*, *Hadromys*, *Millardia*, *Pyromys*, *Stenocephalemys*, *Dacnomys*, *Eropeplus*, *Thallomys*, *Aethomys*, *Rattus*, *Lorentzimys* (the last not seen), *Gyomys*, *Leporillus*, *Pseudomys*, *Apomys*, *Melomys*, *Uromys*, *Coelomys*, *Malacomys*, *Haeromys*, *Chiromyscus*, *Zelotomys*, *Colomys*, *Nesoromys*, *Leggadina*, *Mus*, *Muriculus*, *Hylenomys*, *Mycteromys*, *Crunomys*, *Macruromys*;

Notomys; Mastacomys; Golunda; Lophuromys, Uranomys, Acomys; Echiothrix, Melasmothrix (the last not seen); *Beamys, Saccostomus; Cricetomys; Bandicota, Nesokia; Phloeomys*)

DISTRIBUTION

Below is given a list of the genera, principal species, and their approximate ranges, of the family Muridae, in the geographical regions of the world. A similar list, including the Rodentia other than Muridae, will be found in Vol. I.

Muridae of the Palaearctic

Genus *Micromys*

minutus. England, Central Europe, north to Germany, south to France, Italy, Rumania; Finland, Russia; Siberia to Amur region; Szechuan; Japan.

Genus *Apodemus*

mystacinus group. Asia Minor, Greece.

sylvaticus group. All Europe (including Iceland). Siberia, to Altai; Turkestan. Asia Minor, Syria, Persia, Kashmir; Morocco.

geisha group. Japan.

speciosus group. Eastern Siberia; Japan; Szechuan, Manchuria.

agrarius group. Eastern Europe (Germany to Bulgaria); Russia, Turkestan; Ussuri (East Siberia). Szechuan, Kansu, Manchuria, Shantung, Korea.

Genus *Arvicanthis*

niloticus. Egypt.

Genus *Lemniscomys*

barbarus. Morocco.

Genus *Millardia*

meltada. Punjab.

Genus *Rattus*

rattus group. Throughout Europe. Russian Turkestan. Tibet, Kashmir; Japan; Egypt, Syria, etc. Morocco.

norvegicus group. Throughout Europe. Siberia; Manchuria, Shansi, Kansu, and most of Palaearctic China.

confucianus group. Szechuan, Tibet, Shantung, Shensi, Chihli.

edwardsi group. Szechuan.

coucha group. Morocco.

Genus *Mus*

musculus group. Throughout the entire Palaearctic region.

booduga. Punjab.

platythrix. Punjab.

Genus *Golunda*

ellioti. Punjab and North-west Frontier.

Genus *Acomys*

russatus. Egypt, Sinai.

cahirinus group. Egypt, Tripoli, Cyprus, Crete.

Genus *Bandicota*

bengalensis. Kashmir.

Genus *Nesokia*

indica. North-west Frontier, Afghanistan, Russian Turkestan, Chinese Turkestan; Mesopotamia, Syria, Palestine, Egypt.

Genus *Calomyscus*

bailwardi. Persia, Baluchistan, Russian Turkestan.

Genus *Cricetulus*

barabensis group. South Siberia, west to Barnaul, east to Amur; Mongolia, Manchuria, Chihli, and Shantung.

longicaudatus group. Tibet, Shansi, Chihli, Mongolia, Kansu, and Minussinsk district (Siberia).

lama group. Tibet, Kashmir.

migratorius group. Greece, South Russia, Syria, Asia Minor, Persia, Russian and Chinese Turkestan.

eversmanni group. South-east Russia, Turkestan, Mongolia.

triton group. Kansu, Shantung, Shensi, Chihli, Korea, and South Ussuri.

Genus *Phodopus*

songorus group. Southern Siberia (East Kazakstan to Transbaikalia), and Mongolia.

roborovskii group. Shensi, Tibet, Mongolia, (?) Manchuria.

Genus *Cricetus*

cricetus. Belgium, North France, Germany, Hungary, Yugoslavia, Rumania, Russia, Caucasus, Turkestan to Minussinsk; (?) Iraq.

Genus *Mesocricetus*

auratus group. Caucasus, North Persia, Syria, Rumania, Bulgaria.

Genus *Myospalax*

fontanieri group. Kansu, Shansi, Szechuan.

smithi. Kansu.

psilurus. Chihli, Manchuria, Transbaikalia, Ussuri.

myospalax. Russian Altai.

armandi group. Mongolia, Irkutsk.

Genus *Gerbillus*

campestris group. Morocco, North Algeria, Tripoli.

garamantis group. Algeria; Baluchistan.

dasyurus group. Egypt, Sinai, Palestine.

simoni group. Algeria; Egypt.

gerbillus group. Algeria across North Africa to Syria and Mesopotamia.

pyramidum group. Morocco across North Africa to Egypt, Palestine.

Genus *Tatera*

indica. Punjab, Persia, Mesopotamia, Syria.

Genus *Pachyuromys*

duprasi. North Algeria; Egypt.

Genus *Meriones*

calurus. Sinai.

persicus group. Persia, Baluchistan, Russian Turkestan, Transcaucasia.

tamaricinus group. Palestine, Syria, Asia Minor, Caucasus, South-east Russia, Russian Turkestan, Gobi desert, Chinese Turkestan.

libycus group. Egypt, Tripoli, Algeria; Morocco; Palestine, Syria, Afghanistan, Persia, Russian Turkestan, Transcaucasia, Gobi desert.

meridianus group. South-east Russia, Caucasus, Russian Turkestan, Mongolia, Shansi, Chihli.

unguiculatus. Mongolia, Shansi, Transbaikalia.

hurrianae. Punjab, North-west Frontier.

Genus *Psammomys*

obesus group. Algeria, Tripoli, Egypt, Palestine.

Genus *Brachiones*

przewalskii. Chinese Turkestan, Gobi desert.

Genus *Rhombomys*

opimus. Russian Turkestan, Chinese Turkestan, Mongolia.

Genus *Dicrostonyx*

torquatus. Arctic Russia, Siberia, and islands to the north.

Genus *Myopus*

schisticolor. Scandinavia, North Russia, Altai, North-east Siberia, North Mongolia.

Genus *Lemmus*

lemmus. Scandinavia, North-west Russia.

obensis group. Northern Russia, Siberia, and islands to the north.

Genus *Clethrionomys*

glareolus group. Europe from Sweden to Pyrenees and Yugoslavia, and England eastwards to Ural Mountains. Tianshan; Syansk Mountains (west of Lake Baikal).

nageri group. Switzerland, Italy, Yugoslavia, France; Norway; Hebrides; Channel Islands; Asia Minor; Tianshan.

rutilus group. North Scandinavia, Northern Russia and Siberia; Japan. To Altai, Manchuria.

rufocanus group. Scandinavia, Russia, Siberia to Kamtchatka; Korea, Kansu, Shansi, Szechuan, Hupeh; Mongolia, Chihli; Japan.

(*sikotanensis* (*Clethrionomys* ?); Kuriles.)

Genus *Aschizomys*

lemminus. North-east Siberia.

Genus *Eothenomys*

melanogaster. Szechuan.

Genus *Anteliomys*

chinensis group. Szechuan.

Genus *Alticola*

roylei group. Russian Turkestan, Chinese Turkestan, Kashmir, Tianshan, Mongolia.

stoliczkanus group. Tibet, Kashmir.

macrotis. Syansk Mountains (Siberia).

strelzowi group. Siberian Altai, Mongolia.

Genus *Hyperacrius*

wynnei group. Kashmir, Punjab.

Genus *Dolomys*

bogdanovi. Yugoslavia, Greece.

Genus *Microtus*

agrestis group. Europe, including Scandinavia, England and Hebrides, Spain (and south to North Italy, Yugoslavia); U.S.S.R. to Lake Baikal; Mongolia; Zungaria.

arvalis group. Europe, south of Baltic; Orkneys, Channel Islands (not England); (south to Spain and Greece); Asia Minor, Russia, Caucasus, Turkestan, Altai, Transbaikalia, Mongolia, Kansu, Korea, Japan.

oeconomus group. Scandinavia, Holland, Germany, Hungary, Russia, Siberia to Pacific coast, and Semirechyia.

guentheri group. Greece, Asia Minor, Palestine, Libya; Spain.

nivalis group. Spain, France, Switzerland, North Italy, South Germany, Yugoslavia; Caucasus, Asia Minor, Syria, Palestine.

socialis group. Persia, South Russia, Russian Turkestan.

roberti group. Asia Minor, Caucasus.

calamorum group. Transbaikalia, Ussuri, Manchuria, Shensi, Kiangsu.

middendorffi group. Siberia (Ural, Ob, Yenesei regions).

gregalis group. Throughout Northern Siberia, south to Northern Kazakstan; Mongolia, Chinese Turkestan.

millicens. Szechuan.

mandarinus group. Shansi, Mongolia, Chihli.

Genus *Lasiopodomys*

brandti. Mongolia, Manchuria, Transbaikalia.

Genus *Proedromys*

bedfordi. Kansu.

Genus *Phaiomys*

leucurus group. Tibet, Chinese Turkestan, North India (Upper Sutlej valley).

Genus *Neodon*

carruthersi. Russian Turkestan.
juldaschi. Russian Pamir.
oniscus, etc. Kansu, Szechuan.

Genus *Pitymys*

subterraneus group. Belgium, France, Hungary, Rumania, Switzerland, Italy, Yugoslavia, Ukraine, Asia Minor, Caucasus.
savii group. Sicily, Italy, South France.
ibericus group. Spain, South France; Greece, Montenegro.

Genus *Blanfordimys*

afghanus group. Afghanistan, Russian Pamir.

Genus *Arvicola*

terrestris group. Europe (except Ireland); Siberia, to Amur River; Turkestan; Syria, Persia.

Genus *Lagurus*

lagurus group. South Russia, Turkestan to Zungaria.
luteus group. Russian Turkestan, Chinese Turkestan, Zungaria, Zaidam, Mongolia.

Genus *Prometheomys*

schaposchnikowi. Caucasus.

Genus *Ellobius*

talpinus group. South Russia, Turkestan, Altai, Chinese Turkestan, Mongolia.
fuscocapillus group. Baluchistan, Afghanistan, South Russian Turkestan, Persia, Asia Minor.

Muridae of the Nearctic

Genera, principal species, and approximate ranges. (Canada and U.S.A. The House-Rats, and House-Mice, *Rattus rattus*, *R. norvegicus*, and *Mus musculus*, are introduced; these species may occur in any part of the world.)

Genus *Oryzomys*

palustris group. Florida, Texas, and South-eastern United States.

Genus *Reithrodontomys*

humulis group. South Carolina, Virginia, Texas, Nebraska.
megalotis group. Colorado, Kansas, New Mexico, Arizona, California, Idaho.
fulvescens group. Texas, Oklahoma, Louisiana.

Genus *Peromyscus*

californicus group. Idaho, Utah, California, New Mexico, Arizona.
maniculatus group. Throughout the area: Labrador to Alaska; California to Florida.
leucopus group. Texas, Arizona, north to Massachusetts, New York, and Montana; Florida, Georgia, Alabama.
boylii group. California, Utah, Texas.
truei group. New Mexico, Colorado, California.

(*Peromyscus*) *nuttalli* group. Virginia, South Carolina, to Arkansas.
floridanus group. Florida.

Genus *Baiomys*
taylori. Texas.

Genus *Onychomys*
leucogaster group. North Dakota, Idaho, New Mexico, Oregon, Utah, Arizona, California, Texas, Oklahoma, north to Alberta, Saskatchewan.

Genus *Sigmodon*
hispidus group. Florida, Texas, Arizona.
fulviventer group. Texas, New Mexico.

Genus *Neotoma*
floridana group. Florida, Louisiana, Illinois, Nebraska, Kansas, Texas, New Mexico.
albigula group. Arizona, California, New Mexico, Utah, Colorado.
intermedia group. California, Arizona.
mexicana group. Colorado, Arizona, New Mexico.
desertorum group. California, Utah, Arizona.
pennsylvanica group. Pennsylvania, to Tennessee.
fuscipes group. California.
cinerea group. California, Nevada, Alberta, British Columbia, Washington, Oregon, Arizona, Colorado, South Dakota.

Genus *Dicrostonyx*
hudsonius. Labrador.
rubricatus, etc. Alaska, Arctic Canada; Greenland.

Genus *Synaptomys*
cooperi. New Jersey, Virginia, Quebec, west to Kansas and Minnesota.
borealis. Alaska, Mackenzie, British Columbia, Washington; Labrador; New Hampshire.

Genus *Lemmus*
trimucronatus, etc. Alaska, Mackenzie, Alberta, to Baffin Land.

Genus *Clethrionomys*
dawsoni, and allies. British Columbia, Alaska, Yukon, Ungava, Oregon.
gapperi, and allies. Ontario, New Hampshire, New Jersey, the Dakotas, Mackenzie, Colorado, British Columbia, Idaho. North Carolina. New Mexico.
californicus. California.
proteus. Labrador.

Genus *Phenacomys*
intermedius group. British Columbia, Washington, Idaho, California, Wyoming, Montana. New Mexico.
ungava group. Ungava, Quebec, Labrador, Mackenzie.
albipes group. California.
longicaudus group. Oregon.

Genus *Microtus*

pennsylvanicus group. Labrador and North Carolina to Alberta, Montana, Colorado, New Mexico. Admiralty Island (Alaska).

montanus group. Arizona, Wyoming, California, Utah, Nevada, Washington, Oregon, British Columbia.

californicus group. California.

operarius group. Alaska, Mackenzie.

abbreviatus group. Alaska.

townsendi group. Oregon, California, British Columbia.

longicaudus group. Washington to South Dakota, California, Arizona. Islands off Alaska.

mexicanus group. Texas, Arizona.

xanthognathus group. Alberta to Alaska, and Arctic coast.

chrotorrhinus group. New Hampshire, Labrador, Quebec, North Carolina.

richardsoni group. Washington, Idaho, Oregon, Wyoming, British Columbia, Alberta.

oregoni group. Oregon, California, British Columbia, Washington.

Genus *Pedomys*

ochrogaster group. Wisconsin, Missouri, Oklahoma, Louisiana, Nebraska, Kansas, the Dakotas, Colorado, Montana, Alberta.

Genus *Pitymys*

pinetorum group. Georgia, New York, Mississippi, Oklahoma, Florida.

Genus *Lagurus*

curtatus group. Nevada, Oregon, North Dakota, Washington, Utah, Alberta, Idaho, East California.

Genus *Neofiber*

alleni. Florida.

Genus *Ondatra*

zibethica group. Alaska to Hudson Bay; Labrador; most of U.S.A. except extreme south central portion; and not Florida.

Muridae of the Indo-Malayan Region

Genus *Hapalomys*

longicaudatus group. Tenasserim, Annam, Hainan.

Genus *Lenomys*

meyeri group. Celebes.

Genus *Chiropodomys*

gliroides group. Assam, Sumatra (Nias Island), Java, Borneo, Philippines (Calamianes Island).

fulvus. Yunnan.

Genus *Vandeleuria*

oleracea group. Peninsular India, Ceylon, Nepal, Tongking, Siam.

Genus *Micromys*

minutus. Assam.

Genus *Apodemus*

sylvaticus group. Yunnan.

speciosus group. Liukiu Islands; Nepal, Burma, Yunnan, Formosa.

agrarius group. Fukien, Yunnan.

Genus *Carpomys*

melanurus. Luzon (Philippines).

phaeurus. Luzon (Philippines).

Genus *Batomys*

granti. Luzon (Philippines).

Genus *Pithecheir*

melanurus. Malay Peninsula, Sumatra, Java.

Genus *Crateromys*

schadenbergi. Luzon (Philippines).

Genus *Mallomys* (?)

armandvillei (? *Mallomys*). Flores.

Genus *Hadromys*

humei. Manipur.

Genus *Millardia*

meltada group. Peninsular India, Ceylon.

kathleenae. Burma.

gleadowi. Sind.

Genus *Pyromys*

priestleyi. Sind.

Genus *Dacnomys*

millardi. Sikkim, Assam, Laos.

Genus *Eropeplus*

canus. Celebes.

Genus *Rattus*

baluensis group. Sumatra, Borneo.

macleari. Christmas Island.

nativittatus. Christmas Island.

blanfordi group. Peninsular India.

cutchicus group. Peninsular India.

canus group. Selangor, Sumatra (Pulau Tuangku), Java; Liukiu Islands.

rattus group. Throughout India, Ceylon, Burma, Southern China; Formosa, Hainan; Annam, Siam, Malay Peninsula, Sumatra, Java, Borneo, Celebes, Philippines.

norvegicus group. Celebes, Philippines; Yunnan.

hoffmani group. Celebes. (?) Andamans.

concolor group. Burma, Sumatra, Java, Borneo, Celebes, Flores, Philippines.

mülleri group. Tenasserim, Siam, Malay Peninsula, Kwantung; Sumatra, Java, Borneo.

(*Rattus*) *chrysocomus* group. Celebes.

coelestis group. Celebes.

xanthurus group. Celebes, Philippines.

confucianus group. South China, Hainan, Formosa, Nepal, Ceylon, Burma, Assam, Siam, Annam, Liukiu Islands, Sumatra, Borneo, Java.

cremoriventer group. Siam, Annam, Tenasserim, Sumatra, Java, Borneo, Celebes.

whiteheadi group. Siam, Malay Peninsula, Sumatra, Borneo, Celebes.

baeodon. Borneo.

eha group. Sikkim, Yunnan.

lepturus. Java.

bartelsi. Java.

rajah group. Tenasserim, Annam, Siam, Formosa, Malay Peninsula, Sumatra, Java, Borneo, Philippines.

edwardsi group. Himalayas, Assam, South China, Annam, Siam, Malay Peninsula, Sumatra, Java, Borneo.

bowersi group. Yunnan, Fukien, Siam, Assam, Burma, Tenasserim.

berdmorei group. Burma, Siam.

musschenbroeki group. Celebes.

hellwaldi group. Celebes.

dominator group. Celebes.

Genus *Apomys*

hylocoetes group. Philippines.

Genus *Coelomys*

mayori group. Ceylon.

Genus *Haeromys*

margarettae group. Borneo, Celebes.

Genus *Chiromyscus*

chiropus. Burma, Annam.

Genus *Mus*

musculus group. Liukiu Islands, South China, Nepal, and through India. (Races named Java, Celebes, etc., ? introduced.)

booduga group. Peninsular India, Burma, Siam, Yunnan.

pahari. Sikkim, Yunnan.

platythrix group. India, Ceylon, Burma.

(*castaneus*, not seen; Philippines).

Genus *Mycteromys*

crociduroides. Java, Sumatra.

Genus *Crunomys*

fallax, etc. Philippines.

Genus *Golunda*

ellioti. Peninsular India, Ceylon, Bhutan, Nepal, Sind.

Genus *Echiothrix*

leucura group. Celebes.

Genus *Melasmothrix*

naso. Celebes.

Genus *Acomys*

cahirinus group. Sind.

Genus *Bandicota*

bengalensis group. Bengal, Peninsular India, Sind, Ceylon, Malay Peninsula, Sumatra.

gracilis. Ceylon.

indica group. Siam, Burma, Madras, Bengal, Yunnan, Formosa, Java, Sumatra.

gigantea group. Peninsular India. Annam.

Genus *Nesokia*

indica. Sind, North India.

Genus *Phloeomys*

cumingi group. Philippines (Luzon).

Genus *Rhynchomys*

soricoides. Philippines (Luzon).

Genus *Celaenomys*

silaceus. Philippines (Luzon).

Genus *Chrotomys*

whiteheadi. Philippines (Luzon).

Genus *Gerbillus*

garamantis group. Sind.

gerbillus group. Sind.

Genus *Tatera*

indica group. Sind, Peninsular India, Ceylon.

Genus *Meriones*

hurrianae. Delhi (from Palaearctic India).

Genus *Eothenomys*

melanogaster group. Burma, Assam, Yunnan, Fokien; (?) Formosa.

olitor group. Yunnan.

Genus *Anteliomys*

chinensis group. Yunnan.

Genus *Alticola*

roylei. Kumaon (from Palaearctic India).

Genus *Microtus*

calamorum group. Yunnan.

Genus *Phaiomys*

leucurus group. Mount Everest.

Genus *Neodon*

sikimensis. Sikkim.

forresti. Yunnan.

There are also three genera named from the Philippines, which are not represented in London: *Limnomys*, *Tarsomys*, *Tryphomys*.

Muridae of Africa

(This area includes Arabia, but not the northern coastal Palaearctic portion of Africa.)

Genus *Thamnomys*
- *rutilans* group. Cameroons, Congo.
- *venustus* group. Congo, Ruwenzori.

Genus *Grammomys*
- *dolichurus* group. Sudan, Kenya, Uganda, Tanganyika, East Congo, Portuguese East Africa, south to Capetown district; Liberia, Timbuktu.
- *ruddi*. Portuguese East Africa.

Genus *Oenomys*
- *hypoxanthus* group. Gaboon, Gold Coast, Congo, Uganda, Kenya, Angola.

Genus *Mylomys*
- *cuninghamei*. Sudan, Kenya, Uganda, Congo, Gold Coast.

Genus *Dasymys*
- *incomtus* group. South Africa, South-west Africa, Angola, Congo, Uganda, Kenya, Sudan, Abyssinia, Nigeria, Liberia.

Genus *Arvicanthis*
- *niloticus* group. Sudan, Arabia, Uganda, Abyssinia, Somaliland, Kenya, Tanganyika, East Congo; Asben, Gold Coast, Sierra Leone, Portuguese Guinea; south to Northern Rhodesia.

Genus *Pelomys*
- *fallax* group. Portuguese East Africa, Rhodesia, South-west Africa, Congo, Angola, Uganda, Kenya.
- *harringtoni* group. Abyssinia.
- *rex*. Abyssinia.
- *isseli*. Lake Victoria (Kome Island).

Genus *Lemniscomys*
- *barbarus* group. Sudan, Kenya, Tanganyika, East Congo, Asben, Nigeria, Gambia.
- *striatus* group. Sierra Leone, Nigeria, Sudan, Kenya, Abyssinia.
- *griselda* group. Gambia, East Congo, Angola, Kenya, Tanganyika, Portuguese East Africa, South-west Africa, South Africa.

Genus *Rhabdomys*
- *pumilio*. South Africa to Angola and Kenya.

Genus *Hybomys*
- *univittatus* group. Uganda, Cameroons, Nigeria.
- *trivirgatus*. Liberia, Gold Coast.

Genus *Stenocephalemys*
- *albocaudata*. Abyssinia.

Genus *Aethomys*
- *walambae*. Kenya, Uganda, Congo, North Rhodesia.

(*Aethomys*) *kaiseri*, etc. East Congo, Kenya, Uganda, Tanganyika, Sudan, Nigeria, Angola.

chrysophilus. Kenya, Tanganyika, South Congo, South Africa, South-west Africa, Portuguese East Africa.

Genus *Thallomys*

namaquensis group. South Africa, South-west Africa, Portuguese East Africa.

nigricauda group. Kenya, Angola, South-west Africa, South Africa.

Genus *Rattus*

rattus group. Arabia, Kenya, etc.

longicaudatus group. Cameroons, Congo.

tullbergi group. Gold Coast, Nigeria, Liberia, Congo, Kenya, Sudan, Tanganyika, Uganda.

aeta group. Cameroons, Nigeria, Liberia, Angola, Congo, Kenya.

defua. Liberia.

verreauxi group. Abyssinia, Somaliland, Kenya, Angola, South-west Africa, South Africa, Gold Coast.

coucha group. South Africa, South-west Africa, Abyssinia, Kenya, Uganda, Sudan, Tanganyika, Gold Coast, Nigeria, Senegal.

granti. Cape Colony.

woosnami. Bechuanaland.

Genus *Malacomys*

longipes. Congo, Gabon.

edwardsi. Liberia.

Genus *Zelotomys*

hildegardeae group. Kenya, East Congo, Angola, North Rhodesia.

Genus *Hylenomys*

callewaerti. South Congo.

Genus *Muriculus*

imberbis. Abyssinia.

Genus *Mus*

musculus group. Arabia, Somaliland, etc.

bufo group. Uganda, Kenya, East Congo.

minutoides group. Kenya, Abyssinia, Uganda, Congo, Angola, Portuguese East Africa, South-west Africa, South Africa; Gold Coast, Cameroons, Nigeria.

tenellus group. Kenya, South Africa.

Genus *Colomys*

goslingi group. Kenya, Congo, Cameroons.

Genus *Lophuromys*

woosnami group. Uganda.

sikapusi group. Tanganyika, Kenya, Abyssinia, Congo, Cameroons, Gold Coast.

Genus *Acomys*

cahirinus, and others. Sudan, Arabia, Asben, Kenya, Abyssinia, Somaliland, Rhodesia, Portuguese East Africa.

wilsoni. Kenya, Sudan, Uganda.

subspinosus. Cape region.

Genus *Uranomys*

ruddi group. Uganda, Nyasa, Gold Coast, Nigeria, Gambia.

Genus *Beamys*

hindei group. Kenya, Nyasa.

Genus *Saccostomus*

campestris group. Portuguese East Africa, South Africa, South-west Africa, Uganda, Kenya.

Genus *Cricetomys*

gambianus group. Gambia, Liberia, Nigeria, Gaboon, Congo, Angola, South-west Africa, Transvaal, Portuguese East Africa, Kenya, Uganda, Sudan, Zanzibar.

Genus *Dendromus*

mesomelas group. South Africa, South-west Africa, Angola, Kenya, Congo, Abyssinia, Sudan, Uganda, Nigeria.

melanotis group. South Africa, South-west Africa, Angola, Kenya, Abyssinia, Congo, Nigeria.

lovati group. Abyssinia.

Genus *Steatomys*

pratensis group. Portuguese East Africa, Congo, South Africa, South-west Africa, Angola, Tanganyika, Sudan, Nigeria, Kenya.

bocagei group. Angola, Nigeria, Gold Coast.

Genus *Malacothrix*

typicus. South Africa, South-west Africa.

Genus *Prionomys*

batesi. Cameroons.

Genus *Petromyscus*

collinus group. South-west Africa.

monticularis. South-west Africa.

Genus *Deomys*

ferrugineus. Congo.

Genus *Otomys*

laminatus. South Africa.

anchietae. Angola, Tanganyika.

typus group. Abyssinia, Kenya, Uganda.

irroratus group. Kenya, Uganda, East Congo, Tanganyika, Cameroons, Portuguese East Africa, Rhodesia, South Africa.

karoensis. Cape Colony.

turneri. Orange River Colony.

unisulcatus group. South Africa, South-west Africa.

Genus *Parotomys*

brantsii. South Africa, South-west Africa.

littledalei. South Africa.

Genus *Mystromys*

albicaudatus group. South Africa.

Genus *Tachyoryctes*

macrocephalus group. Abyssinia.

splendens group. Abyssinia, Somaliland, Kenya, Uganda, North Tanganyika, East Congo.

Genus *Gerbillus*

campestris group. Arabia, Sudan, Asben.

garamantis. Arabia.

famulus. Arabia.

dasyurus group. Arabia, Sudan, Somaliland, Kenya.

simoni group. Somaliland, Kenya.

nancillus. Sudan.

vallinus. South-west Africa, South Africa.

swalius group. South Africa, South-west Africa.

gerbillus group. Sudan, Kenya, Somaliland, Arabia, Nigeria, Rio de Oro.

pyramidum group. Somaliland.

Genus *Microdillus*

peeli. Somaliland.

Genus *Tatera*

robusta group. Sudan, Somaliland, Kenya, Abyssinia, Tanganyika, Gold Coast. Portuguese Guinea.

liodon group. Sudan, Uganda, North Rhodesia, Kenya, East Congo, Angola.

afra group. Uganda, East Congo, South Africa, Portuguese East Africa, South-west Africa, Angola, Tanganyika, Nigeria, Gambia, Gold Coast.

ruddi group. Zululand.

boehmi group. Uganda, Tanganyika, Kenya, Nyasa.

Genus *Taterillus*

emini group. Senegal, Nigeria, Sudan, East Congo, Kenya, Uganda, Abyssinia.

Genus *Desmodillus*

auricularis. South Africa, South-west Africa.

Genus *Desmodilliscus*

braueri. Sudan, Nigeria.

Genus *Ammodillus*

imbellis. Somaliland.

Genus *Meriones*

rex group. Arabia.

libycus group. Sudan, Arabia, Asben.

Genus *Psammomys*

obesus group. (?) Sudan.

There are also two named genera which are unrepresented in London: *Nilopegamys*, from Abyssinia, and *Leimacomys*, from Togoland, West Africa.

Muridae of the Neotropical Region

(According to Flower & Lydekker, Mexico should be included in this region.)

Genus *Oryzomys*

palustris group. Guatemala, Mexico, Nicaragua, Honduras, Panama, Jamaica.
melanotis group. Mexico.
alfaroi group. Mexico, Guatemala, Costa Rica, Panama.
talamancae group. Costa Rica, Panama, Colombia, Venezuela.
bombycinus group. Costa Rica, Panama.
devius group. Panama, Colombia, Venezuela, Ecuador.
tectus group. Panama, Colombia, Venezuela.
pyrrhorhinus group. East Brazil (Bahia).
barbacoas. Colombia, Ecuador.
galapagoensis. Galapagos.
intectus. Colombia.
wavrini. Paraguay.
ratticeps. South Brazil, Paraguay.
longicaudatus. Peru to South Chile and Patagonia.
fulvescens group. Mexico, Costa Rica, Panama, Peru, Colombia, Venezuela, British Guiana, Matto Grosso.
minutus group. Ecuador, Peru, Colombia.
indefessus group. Galapagos.
bicolor group. Panama, Ecuador, Bolivia, South Brazil, Venezuela, Colombia, Peru, British Guiana.
caliginosus group. Panama, Colombia, Ecuador, Costa Rica.
Many species named from all countries in South America,

Genus *Megalomys*

desmarestii group. Martinique, St. Lucia.

Genus *Neacomys*

spinosus group. Peru, Colombia, Matto Grosso, Ecuador, British Guiana, Panama.

Genus *Nectomys*

alfari. Costa Rica, Nicaragua, Panama.
hammondi. Ecuador.
dimidiatus. Nicaragua.
squamipes, and others. South Brazil, British Guiana, Paraguay, Colombia, Ecuador, Peru.

Genus *Rhipidomys*

leucodactylus group. Panama, British Guiana, Colombia, Venezuela, Ecuador, Peru, Bolivia, Eastern Brazil, North Argentina.

Genus *Thomasomys*

aureus group. Ecuador, Colombia, Peru.

pyrrhonotus group. Ecuador, Peru.

dorsalis group. South-east Brazil.

lugens group. Colombia, Venezuela, Ecuador.

cinereus group. Ecuador, Colombia, Peru, Bolivia, Venezuela, British Guiana, South Brazil, North Argentina.

Genus *Phaenomys*

ferrugineus. Rio de Janeiro (Brazil).

Genus *Chilomys*

instans. Colombia.

Genus *Tylomys*

nudicaudus group. Mexico, Guatemala, Panama, Ecuador.

Genus *Ototylomys*

phyllotis group. Mexico, Guatemala, Nicaragua, Costa Rica.

Genus *Nyctomys*

sumichrasti. Mexico, Guatemala, Honduras, Nicaragua, Panama.

Genus *Otonyctomys*

hatti. Mexico (Yucatan).

Genus *Rhagomys*

rufescens. Rio de Janciro (Brazil).

Genus *Reithrodontomys*

megalotis group. Mexico.

fulvescens group. Mexico.

rufescens group. Mexico, Guatemala, Costa Rica, Nicaragua.

levipes group. Mexico (Jalisco).

chrysopsis group. Mexico.

mexicanus group. Mexico, Honduras, Guatemala, Costa Rica, Colombia, Ecuador.

tenuirostris group. Mexico, Guatemala, Panama.

Genus *Peromyscus*

californicus group. Northern Mexico.

maniculatus group. Mexico.

leucopus group. Mexico.

boylii group. Mexico, El Salvador.

truei group. Mexico.

melanophrys group. Mexico.

lepturus group. Mexico, Guatemala, Costa Rica, Panama.

mexicanus group. Mexico, El Salvador, Guatemala.

megalops group. Mexico.

thomasi group. Mexico, Panama.

Genus *Baiomys*

taylori group. Mexico, Honduras.

Genus *Onychomys*

leucogaster group. Mexico.

Genus *Akodon*

boliviensis group. Uruguay, Argentina, Patagonia, Chile, Paraguay, East Brazil, Peru, Bolivia, Ecuador.

lenguarum. Paraguay.

obscurus. Uruguay.

urichi group. Ecuador, Colombia, Peru, Venezuela.

kempi. East Argentina.

budini. Jujuy (Argentina).

lasiotis. East Brazil.

subterraneus group. South-east Brazil.

amoenus group. Peru, Bolivia, North Argentina.

lactens. Jujuy.

bacchante. Bolivia, North Argentina.

jelskii. Peru.

pulcherrimus. Peru.

longipilis group. Argentina, Chile, Patagonia.

Genus *Zygodontomys*

cherriei, etc. Costa Rica, Panama, Colombia, Brazil, Venezuela, Dutch Guiana, Peru, Ecuador.

Genus *Microxus*

bogotensis, etc. Colombia, Ecuador, Peru, Rio Grande do Sul, Patagonia.

Genus *Lenoxus*

apicalis. Peru.

Genus *Oxymycterus*

nasutus group. Argentina, Brazil (north to Pernambuco), Paraguay, Bolivia, Peru, Uruguay.

Genus *Blarinomys*

breviceps. East Brazil.

Genus *Notiomys*

edwardsii. Patagonia.

valdivianus group. Chile, Patagonia.

megalonyx group. Chile, Patagonia, Mendoza (Argentina).

Genus *Scapteromys*

tumidus group. Uruguay, East Argentina.

gnambiquarae group. Matto Grosso, North Argentina.

Genus *Scotinomys*

teguina group. Mexico, Guatemala, Honduras, Costa Rica, Panama.

Genus *Hesperomys*

venustus. Argentina.

fecundus. Bolivia.

lepidus. Peru.

bimaculatus, and others. Uruguay, Argentina, Paraguay, Bolivia, Peru, East Brazil.

gerbillus. Peru.

Genus *Eligmodontia*

typus group. Argentina, Bolivia.

Genus *Graomys*

griseoflavus. Argentina, Patagonia, Paraguay, Bolivia.

Genus *Phyllotis*

amicus and allies. Peru, Ecuador.
xanthopygus. Patagonia.
darwini, etc. Peru, Ecuador, Chile, Bolivia, Argentina.
sublimis group. Peru, North Argentina.
boliviensis group. Peru, Bolivia, Patagonia.
garleppi. Bolivia.

Genus *Chinchillula*

sahamae. Bolivia.

Genus *Irenomys*

longicaudatus. Chile.

Genus *Neotomys*

ebriosus group. Peru, North Argentina.

Genus *Reithrodon*

typicus group. Argentina, Uruguay, Chile, Patagonia.

Genus *Euneomys*

chinchilloides, etc. Argentina, Patagonia.

Genus *Chelemyscus*

fossor, North-west Argentina.

Genus *Holochilus*

vulpinus, etc. Brazil, Argentina, Paraguay, Chile, Patagonia, Uruguay, Peru, British Guiana, Venezuela.

Genus *Sigmodon*

hispidus group. Mexico, Honduras, Nicaragua, Costa Rica, Panama.
fulviventer group. Mexico.
hirsutus, etc. Colombia, Venezuela, Ecuador, Peru.

Genus *Sigmomys*

alstoni group. British Guiana, Venezuela.

Genus *Andinomys*

edax. Bolivia.

Genus *Neotomodon*

alstoni group. Mexico.

Genus *Neotoma*

floridana group. Mexico.
albigula group. Mexico.
mexicana group. Mexico, Guatemala, Nicaragua.
desertorum group. North Mexico.

Genus *Hodomys*

alleni group. Mexico.

Genus *Teanopus*

phenax. Mexico.

Genus *Xenomys*
nelsoni. Mexico.
Genus *Nelsonia*
neotomodon group. Mexico.
Genus *Ichthyomys*
hydrobates group. Ecuador, Colombia, Peru, Venezuela.
Genus *Rheomys*
trichotis group. Panama, Costa Rica, El Salvador, Colombia.
Genus *Anotomys*
leander. Ecuador.
Genus *Orthriomys*
umbrosus. Mexico.
Genus *Herpetomys*
guatemalensis. Guatemala.
Genus *Microtus*
mexicanus group. Mexico.
Genus *Pitymys*
quasiater. Western Mexico.

There are also four named genera not represented in London: *Scolomys*, from Ecuador; *Neusticomys*, from Ecuador; *Daptomys*, from Venezuela; *Podoxymys*, from British Guiana.

Muridae of the Australasian Region

Genus *Anisomys*
imitator. New Guinea.
Genus *Pogonomys*
macrourus group. New Guinea.
forbesi group. New Guinea, and adjacent islands.
Genus *Hyomys*
meeki. New Guinea.
Genus *Mallomys*
rothschildi. New Guinea.
Genus *Conilurus*
albipes group. New South Wales.
penicillatus group. North Australia, Melville Island.
Genus *Zyzomys*
argurus. South and North-west Australia.
Genus *Laomys*
pedunculatus group. Central and North-west Australia.
Genus *Mesembriomys*
gouldi group. North Australia, Queensland, Melville Island.
macrurus. Northern West Australia.
Genus *Rattus*
rattus group. Aru Islands, Ceram, New Guinea.
concolor group. Moluccas, New Guinea, Fiji, Hawaii, etc.

(*Rattus*) *leucopus* group. Queensland, New Guinea, Ceram, Solomon Islands.
verecundus group. New Guinea.
niobe group. New Guinea.
tunneyi-villosissimus group. New Guinea, North Australia, Melville Island, Queensland, New South Wales, South Australia, Central and North-west Australia.
fuscipes-lutreolus group. New South Wales, Queensland, North Australia, South Australia, West Australia, Tasmania.

Genus *Lorentzimys*
nouhuysii. New Guinea.

Genus *Gyomys*
novaehollandiae group. Queensland, New South Wales, Victoria, Central and South Australia.

Genus *Leporillus*
apicalis. South Australia.
conditor. New South Wales.

Genus *Pseudomys*
australis group. New South Wales, South Australia, Queensland, West Australia, Tasmania.
nanus group. Queensland, New South Wales, West Australia.

Genus *Melomys*
levipes group. Ceram, New Guinea.
porculus group. Solomon Islands.
cervinipes group. New Guinea, Queensland, Melville Island, Moluccas, Ceram.
bruijnii group. New Guinea, Ceram.
sapientis. Solomon Islands.
ponceleti. Solomon Islands.

Genus *Uromys*
neobritannicus. New Britain.
caudimaculatus group. New Guinea, Queensland, Aru and Kei Islands.
imperator group. Solomon Islands.

Genus *Leggadina*
forresti group. Northern and South Australia.
delicatula group. North, Central, and South Australia, Queensland.
(*Mus musculus*, races named New Guinea, etc. Introduced ?)

Genus *Nesoromys*
ceramicus. Ceram.

Genus *Macruromys*
elegans. New Guinea.
major. New Guinea.

Genus *Notomys*
longicaudatus group. West Australia, New South Wales.
mitchelli group. New South Wales, South Australia, Queensland, West Australia, Northern Territory.
cervinus group. South Australia.

Genus *Mastacomys*
fuscus. Tasmania.

Genus *Hydromys*
chrysogaster. Tasmania, South Australia, West Australia, New South Wales, Queensland, Northern Territory, Aru and Kei Islands, New Guinea, New Britain.

Genus *Parahydromys*
asper. New Guinea.

Genus *Crossomys*
moncktoni. New Guinea.

Genus *Leptomys*
elegans. New Guinea.

Genus *Xeromys*
myoides. Queensland.

Genus *Pseudohydromys*
murinus. New Guinea.

Muridae of Madagascar

Genus *Eliurus*
myoxinus group.

Genus *Nesomys*
rufus group.

Genus *Hypogeomys*
antimena.

Genus *Gymnuromys*
roberti.

Genus *Brachyuromys*
betsileoensis.
ramirohitra.

Genus *Brachytarsomys*
albicauda.

Genus *Macrotarsomys*
bastardi.

Subfamily MURINAE

1896. Thomas: Murinae; Phloeomyinae; Cricetinae, part, *Eliurus*.
1899. Tullberg: Muridae, part, Murini and Phloeomyini; Nesomyidae, part, *Eliurus*.
1918. Miller & Gidley: Murinae, Phloeomyinae. Also Cricetidae, part, *Eliurus* (presumably).
1924. Winge: Muridae, Murini, part, Mures, part; Rhizomyini, part, *Eliurus*.
1928. Weber: Murinae, part. Nesomyidae, part, *Eliurus*.

Natural Distribution.—Cosmopolitan in the Old World, including Australasia, and as here understood Madagascar.

Number of Genera.—Seventy-one have been retained, not including a few named genera unrepresented in London.

Characters.—Jaw muscles as in typical Muridae, the infraorbital foramen enlarged to transmit a portion of muscle; zygomatic plate always broadened and tilted upwards to a greater or lesser degree; infraorbital foramen usually specialized into a wider portion for muscle-transmission and a lower, narrower one for nerve-transmission; cheekteeth $\frac{3}{3}$; molars rooted; upper molars laminate or cuspidate, when cuspidate, the cusps arranged in three longitudinal rows, the inner row not vestigial, always with two functional cusps (compare Dendromyinae), the laminae of molars, either with or without cusps, not separated by wide folds or valleys, but pressed tightly together (compare Cricetinae); M.3 not tending to become the dominant tooth, or only to a very slight degree in exceptional cases (compare Otomyinae), skull and external form not modified for semi-saltatorial plains or desert life (as lengthening of limbs, great enlargement of bullae and braincase, etc.) (compare Gerbillinae); cheekteeth not becoming basinshaped, and with the outer row of cusps usually normally developed, and always traceable (compare Hydromyinae); incisors and cheekteeth not vestigial (compare Rhynchomyinae), external form not modified for subfossorial life, and molars not evergrowing (compare Myospalacinae), cheekteeth not prismatic and skull not developing squamosal crest, median interorbital crest, etc. (compare Microtinae), cheekteeth not characterized by pattern of long oblique isolated enamel folds (compare Tachyoryctinae), and zygomatic plate not completely beneath infraorbital foramen (compare Deomyinae).

External form various, but never highly specialized for aquatic life, or for underground life; but either generalized or presenting various degrees of specialization towards arboreal life. In one case, apparently saltatorial (*Notomys*).

As thus defined, the group contains the genera currently referred to the subfamily, and also the genera *Crunomys*, *Phloeomys*, *Saccostomus*, *Beamys*, and *Eliurus*, which will be discussed below.

HISTORY OF THE CLASSIFICATION OF THE SUBFAMILY FROM 1896

(The genera not regarded as valid in the present work are marked *)

1896. In 1896, Thomas proposed a classification of the Order Rodentia. The Murinae, as here understood, contained the following genera:

Mus, Linnaeus, 1758. Type—*Mus musculus*. (Used in a broad sense, equivalent to the present *Rattus*, *Mus*, *Micromys*, *Apodemus*, and many others. Apparently included *Dasymys*.) Cosmopolitan in the Old World.

GOLUNDA, Gray, 1837. Type—*G. ellioti*, Gray. Indian. (Included also *Pelomys*, Peters, African.)

CONILURUS, Ogilby, 1838. Type—*C. constructor*. (Synonym—*Hapalotis*, Lichtenstein, 1829, preoccupied.) Australian. Included apparently *Notomys*, *Mesembriomys*, *Leporillus*, etc.

PITHECHEIR, Cuvier, 1838. Type—*P. melanurus*. Indo-Malayan.

ACOMYS, Geoffroy, 1838. Type—*Mus cahirinus*. African and Southern Palaearctic.

CRICETOMYS, Waterhouse, 1840. Type—*C. gambianus*. African.

VANDELEURIA, Gray, 1842. Type—*Mus oleraceus*. Indian.

NESOKIA, Gray, 1842. Type—*Arvicola indica*. Palaearctic, and as then understood (i.e., with *Bandicota*), Indo-Malayan.

ARVICANTHIS, Lesson, 1842. Type—*Lemmus niloticus*. African.

SACCOSTOMUS, Peters, 1847. Type—*S. campestris*. African.

HAPALOMYS, Blyth, 1859. Type—*H. longicaudatus*. Indo-Malayan.

LOPHUROMYS, Peters, 1874. Type—*Lasiomys afer*. African. (*Lasiomys*, Peters, 1866; name preoccupied.)

ECHIOTHRIX, Gray, 1867. Type—*E. leucura*. Celebes. (Called "*Craurothrix*" (Thomas), on the assumption that *Echiothrix* was preoccupied.)

UROMYS, Peters, 1867. Type—*Mus macropus* (=*Hapalotis caudimaculatus*). Australasian.

CHIROPODOMYS, Peters, 1868. Type—*C. penicillatus*. Indo-Malayan.

MALACOMYS, Milne-Edwards, 1876. Type—*M. longipes*. African.

MASTACOMYS, Thomas, 1882. Type—*M. fuscus*. Tasmania.

*CHIRUROMYS, Thomas, 1888. Type—*C. forbesi*, from New Guinea. Subsequently shown to be a subgenus of the earlier described

POGONOMYS, Milne-Edwards, 1877. Type—*P. macrourus*, from New Guinea.

CRATEROMYS, Thomas, 1895. Type—*C. schadenbergi*. Philippines.

CARPOMYS, Thomas, 1895. Type—*C. melanurus*. Philippines.

BATOMYS, Thomas, 1895. Type—*B. granti*. Philippines.

Referred to other subfamilies were:

PHLOEOMYS, Waterhouse, 1839 (Phloeomyinae). Type—*P. cumingi*. Philippines.

ELIURUS, Milne-Edwards, 1885. ("Sigmodontinae"=Cricetinae.) Type—*E. myoxinus*. Madagascar.

Since this classification, the genus

DASYMYS, Peters, 1875. Type—*D. guienzii* (=*Mus incomtus*), African, has currently been given generic rank.

1897. Thomas described CRUNOMYS for the new species *fallax*, from the Philippines, regarded as a member of the Hydromyinae.

Waite erected *PODANOMALUS for the Australian saltatorial species *Hapalotis longicaudatus*. But this name has been subsequently shown to be antedated by NOTOMYS, Lesson, 1842.

Waite erected *THYLACOMYS for the Australian species *Hapalotis cervinus*. This name being preoccupied, was replaced in 1900 by *ASCOPHARYNX, Waite.

1898. Thomas erected MALLOMYS for the new species *rothschildi* from New Guinea. (The genus has recently been held to include "*Mus*" *armandvillei*, Jentink, a Giant Rat from Flores, not represented in the British Museum.)

Thomas erected LENOMYS for the species *Mus meyeri*, Jentink, from Celebes.

1902. Thomas erected MURICULUS for the species *Mus imberbis*, from Abyssinia.

Thomas revived Peters' name PELOMYS, 1852 (type—*Mus fallax*, from Africa), for the African species which had previously been referred to *Golunda*, which genus was thus restricted to India.

1903. Thomas erected ANISOMYS for the new species *imitator* from New Guinea.

Thomas erected HYOMYS for the new species *meeki* from New Guinea.

Miller erected *LENOTHRIX for the new species *canus* from an island off Sumatra. Kloss, 1921, and other authors refer it to *Rattus*.

1904. Thomas erected OENOMYS for the African species *Mus hypoxanthus*.

1905. Thomas gave generic rank to the small Palaearctic species previously referred to *Mus* in which the posterointernal cusp of the upper molars is retained, under the name MICROMYS, Dehne, 1841 (type—*M. agilis*=*Mus soricinus*). The genus as then understood was taken to include also the species now referred to *Apodemus*.

Mearns erected APOMYS for the new species *hylocoetes* from the Philippines.

Mearns erected *BULLIMUS for the new species *bagopus*, from the Philippines; shown by Thomas to be a synonym of *Rattus*.

Mearns erected LIMNOMYS for the new species *sibuanus* from the Philippines. It is not represented at the British Museum, not dealt with in the present work and appears to be a synonym of *Rattus*.

Mearns erected TARSOMYS for the new species *apoensis*, from the Philippines. It is not represented in the British Museum and not dealt with in the present work.

1906. Thomas erected MYLOMYS for the new species *cuninghamei* from Africa.

Thomas revised the Australian Rats which had previously been referred to *Conilurus*, which was restricted as now understood.

He erected LEPORILLUS for *Conilurus apicalis*.

He erected *AMMOMYS for *Mus hirsutus* (=*Hapalotis gouldi*); and included in it forms subsequently referred to *Zyzomys* and *Laomys*. *Ammomys* being preoccupied (a synonym of the Microtine genus *Pitymys*), the name was replaced by MESEMBRIOMYS, Palmer, the same year.

He revived Lesson's name NOTOMYS, type—*Dipus mitchelli*, 1842 (see also 1897). In *Notomys* he included Waite's genus "*Ascopharynx*."

1907. Thomas revised the genus NESOKIA, and divided it into three.

He revived Grey's name BANDICOTA, 1873 (type—*Mus giganteus*, Hardwicke; Indo-Malayan).

He erected *GUNOMYS for *Nesokia bengalensis*.

Thomas erected THAMNOMYS for the African species in which the posterointernal cusp of the upper molars is retained (type—*Thamnomys venustus*, Thomas). It contained two groups, the latter subsequently separated as *Grammomys*.

Thomas & Wroughton erected COLOMYS for the new species *goslingi* from Africa.

1908. Thomas showed that Kaup's name APODEMUS, 1829, type—*Mus agrarius*, must stand for the Palaearctic Mice previously referred to *Micromys* (see 1905). The genus *Micromys* has been retained, and restricted to *M. minutus*, the name *Apodemus* used for the other Palaearctic Field-Mice. (Miller, 1912, Cat. Mamm. West. Europe, and others.)

1909. Thomas revised his genus "*Ammomys*" = *Mesembriomys*.

He erected ZYZOMYS for the species *argurus* (Australian).

He erected LAOMYS for the species *pedunculatus* (Australian).

Dollman erected URANOMYS for the new species *ruddi* from Africa.

Thomas erected BEAMYS for the new species *hindei* from Africa.

1910. Miller restricted the genus *Mus* to those forms in which "the mechanical scheme of the molars (is) modified by the elongation of crown of anterior tooth until it forms the main portion of toothrow . . . M.3 small and tending to disappear." As thus restricted it contained only the House-Mice and those small species which had been referred to *LEGGADA, Gray, 1837 (type—*Mus booduga*), which was shown by Miller to be indistinguishable from *Mus*. This conclusion was reached by Thomas, 1914, Journ. Bombay Nat. Hist. Soc., XXII, p. 682, who, however, later revived "*Leggada*."

Miller gave generic rank to the remainder of the Rats and Mice with a less modified toothrow which had been formerly referred to *Mus*, under the name *EPIMYS, Trouessart, 1881 (type—*Mus rattus*). It has been subsequently shown that the correct name to be used for this group is RATTUS, Fischer, 1775.

Thomas revived Gray's name PSEUDOMYS, 1832 (type—*P. australis*, from Australia), for certain Australian species considered distinct from *Epimys* (=*Rattus*). He further divided it into subgenera, each of which have subsequently been given generic rank: *THETOMYS (*Mus nanus*), GYOMYS (*Mus novaehollandiae*), and LEGGADINA (*Mus forresti*).

Thomas erected *DESMOMYS for the Abyssinian species *Pelomys harringtoni*.

Thomas erected HYBOMYS for the African species *Mus univittatus*, and included in the genus *Mus trivirgatus*, the latter subsequently separated as **Typomys*.

Osgood erected ZELOTOMYS for the African species *Mus hildegardeae*, Thomas.

Thomas erected *BUNOMYS for the species *Mus coelestis*, from Celebes. It is regarded by Tate, 1936, as an offshoot of the *Rattus chrysocomus* group.

Thomas erected *STENOMYS for the species *Mus verecundus* and its allies from New Guinea.

Thomas erected *CYROMYS for the species *Mus imperator* and *Mus rex*, from the Solomons; Tate suggests that it is *Uromys*, and Rümmler refers it to that genus.

1911. Miller erected TRYPHOMYS for the new species *adustus* from the Philippines. It is not represented in the British Museum and not dealt with in the present book.

Jentink erected LORENTZIMYS for the new species *nouhuysii* from New Guinea. It is not represented at the British Museum, and not dealt with in the present work.

Thomas erected HAEROMYS for the species *Mus margarettae* and allies (Indo-Malayan islands), stated to be like *Chiropodomys*, but with no posterointernal cusp in the upper molars.

Thomas erected *TYPOMYS for the African species *Mus trivirgatus*, previously referred to *Hybomys* (see 1910). Ingoldby considers it a synonym of *Hybomys*, 1929, and in this he has been followed by Hayman.

Thomas revised certain Field-Rats from India previously included in *Mus*, and subsequently in *Epimys* (=*Rattus*).

He erected MILLARDIA for *Mus meltada*, Gray.

He erected HADROMYS for *Mus humei*, Thomas.

He erected *GRYPOMYS for *Mus gleadowi*, Murray.

He erected PYROMYS for the new species *priestleyi* from Sind.

1912. Wroughton erected *CREMNOMYS for the new species *cutchicus* from India.

1914. Thomas erected *LEGGADILLA for certain Indian Mice, previously referred to "*Leggada*." (Type—*Mus platythrix*.)

Frick erected STENOCEPHALEMYS for the new species *albocaudata*, from Abyssinia.

1915. Thomas divided the African species of *Epimys* (=*Rattus*) into subgenera based on mammary formula. All his names have subsequently been given generic rank.

He erected AETHOMYS, type—*Mus hindei*.
*MASTOMYS, type—*Mus coucha*.
*PRAOMYS, type—*Mus tullbergi*.
*MYOMYS, type—*Mus colonus*.

Thomas revised his genus *Thamnomys*, and erected GRAMMOMYS for those species in which the posterointernal cusp of the upper molars is becoming reduced (type—*Mus dolichurus*, Smuts). Hollister, 1919, regards it as a synonym of *Thamnomys*. It is here retained.

Thomas erected COELOMYS for the new species *mayori* from Ceylon.

1916. Robinson & Kloss erected *OROMYS for the new species *crociduroides* from Sumatra. This name being preoccupied, it was replaced, 1918, by MYCTEROMYS, Robinson & Kloss.

Thomas revised the African Rats which had previously been referred to *Arvicanthis*.

He erected RHABDOMYS, for *Mus pumilio*.

He followed Heller in giving generic rank to Trouessart's subgenus LEMNISCOMYS, 1881 (type—*Mus barbarus*). He restricted *Arvicanthis* to the *testicularis* group.

Thomas erected *DIPLOTHRIX for his species *Lenothrix legatus* from Liukiu Islands.

Thomas erected DACNOMYS for the new species *millardi* from East India.

1917. Thomas erected *GUYIA for his species *Millardia kathleenae* fron Burma.

Kloss erected *TAUTATUS for the new species *thai* from Siam.

Thomas erected *DIOMYS for a new species *crumpi*, based on one broken skull, with much worn teeth, the external characters of which are unknown. It is here regarded as unidentifiable.

1920. Thomas erected THALLOMYS for certain African species, separating them from *Rattus*, subgenus *Aethomys*. (Type—*Mus nigricauda*.)

Thomas erected *OCHROMYS for the African species *Mus woosnami*, Schwann, separating it from *Rattus*.

1921. Miller & Hollister erected EROPEPLUS for the new species *canus* from Celebes.

Miller & Hollister erected MELASMOTHRIX for the new species *naso* from Celebes; it is not represented in London and is not dealt with in the present work.

1922. Thomas erected NESOROMYS for his species *Stenomys ceramicus* from Ceram.

Thomas revised those Rats previously referred to *Uromys*.

He erected MELOMYS (type—*Uromys rufescens*) for the smaller species.

He erected *SOLOMYS for the species *U. sapientis* from the Solomon Islands. This species is regarded as a subgenus of *Melomys* by Rümmler, 1936. In Rümmler's revision of the genus *Melomys*, 1936, two new subgenera are proposed, *Paramelomys* and **Pogonomelomys*.

1924. De Beaux erected *KOMEMYS for the new species *isseli* from an island in Lake Victoria (Africa). It is regarded as a subgenus of *Pelomys* by Hatt and G. Allen.

Ognev divided the Palaearctic genus *Apodemus* into two, erecting *SYLVAEMUS for *Mus sylvaticus* and restricting *Apodemus* to the *agrarius* group. He gave no list of species to give an idea of the limits of either "genus." Forms referred by Vinogradov to "*Sylvaemus*" do not agree with those referred by Thomas to "*Nemomys*" (below).

Thomas divided the Palaearctic genus *Apodemus* into two subgenera, proposing *NEMOMYS for *Mus sylvaticus*. See remarks under *Sylvaemus*, above.

1925. Thomas erected CHIROMYSCUS for his species *Mus chiropus*, from Burma.

(*Chiromyscus*) The species had been referred by Wroughton to *Haeromys* in the Indian Mammal Survey.

Thomas erected HYLENOMYS for the new African species *callewaerti*.

1926. Thomas revised the African species previously included in *Rattus*. *Aethomys* and **Praomys* were discussed, and given generic rank (see 1915).

He erected *STOCHOMYS for *Dasymys longicaudatus*, Tullberg.

He erected *DEPHOMYS for *Mus defua*, Miller.

He erected *HYLOMYSCUS for *Epimys aeta*, Thomas, and related forms.

1928. Dukelski erected *ALSOMYS for "*Mus sylvaticus major*" (=*Apodemus speciosus major*).

Osgood erected NILOPEGAMYS for the new species *plumbeus* from Abyssinia; it is not represented in London, and not dealt with in the present work.

1933. Stein erected MACRUROMYS for the new species *elegans* from New Guinea.

1934. Taylor erected *INSULAEMUS for the new species *calamianensis* from the Philippines. It is regarded by Tate as probably a synonym of *Chiropodomys*.

1935. Troughton erected *UNICOMYS for the new species *ponceleti* from the Solomon Islands. It is regarded as a synonym of *Melomys*, subgenus *Solomys* by Rümmler, 1936.

1936. Sody erected *MAXOMYS for *Mus bartelsi* from Java (=*Rattus bartelsi*).

OUTLINE OF CLASSIFICATION HERE ADOPTED

Not including a few genera not represented at the British Museum, the most important of which are *Lorentzimys* and *Melasmothrix*, I have retained seventy-one genera in this subfamily, though some of these are very doubtfully distinguishable from *Rattus*. Below is a list of these genera and the principal species referred to them.

Group *Eliuri*

Genus 1. ELIURUS, Milne-Edwards.
Principal species: *E. myoxinus* group (all named forms).

Group *Anisomyes*

Genus 2. ANISOMYS, Thomas.
Sole species: *A. imitator*.

Group *Mures* (remainder of subfamily)

Posterointernal-cusp Section

(Generalized complex-toothed types)

Genus 3. HAPALOMYS, Blyth.
Principal species: *H. longicaudatus*.

Genus 4. Pogonomys, Milne-Edwards (as revised by Rümmler).
Subgenus *Pogonomys*: *P. macrourus*, *P. mollipilosus*, *P. sylvestris*.
Subgenus *Chiruromys*: *P. forbesi*, *P. lamia*, *P. vates*.

Genus 5. Lenomys, Thomas.
Principal species: *L. mayeri*.

Genus 6. Chiropodomys, Peters.
Principal species: *C. gliroides* group (all named forms, except (?) *C. fulvus*).

Genus 7. Vandeleuria, Gray.
Principal species: *V. oleracea* group (all named forms).

Genus 8. Micromys, Dehne.
Principal species: *M. minutus* and races.

Genus 9. Apodemus, Kaup.
Principal species: *A. mystacinus* group; *A. sylvaticus* group, with *flavicollis*, etc.; *A. geisha* group; *A. speciosus* group, with *semotus* and *gurkha*; *A. agrarius* group.

Genus 10. Thamnomys, Thomas.
Principal species: *T. venustus* group; *T. rutilans* group.

Genus 11. Grammomys, Thomas.
Principal species: *G. dolichurus* group (all named forms except perhaps *ruddi*).

(Specialized usually simpler-toothed types)

Genus 12. Carpomys, Thomas.
Principal species: *C. melanurus* group; *C. phaeurus* group.

Genus 13. Batomys, Thomas.
Principal species: *B. granti*.

Genus 14. Pithecheir, Cuvier.
Sole species: *P. melanurus*.

Genus 15. Crateromys, Thomas.
Sole species: *C. schadenbergi*.

Genus 16. Hyomys, Thomas.
Principal species: *H. meeki*.

Genus 17. Mallomys, Thomas.
Principal species: *M. rothschildi*; (?) *M. armandvillei* (not seen).

Genus 18. Conilurus, Ogilby.
Principal species: *C. albipes* group; *C. penicillatus* group.

Genus 19. Laomys, Thomas.
Principal species: *L. pedunculatus*; *L. woodwardi*.

Genus 20. Zyzomys, Thomas.
Sole species: *Z. argurus*.

Genus 21. Mesembriomys, Palmer.
Principal species: *M. gouldi* group; *M. macrurus* group.

Rattus Section (no posterointernal cusp)

Genus 22. Oenomys, Thomas.
Principal species: *O. hypoxanthus* group.

Genus 23. MYLOMYS, Thomas.
Principal species: *M. cuninghamei* and races.

Genus 24. DASYMYS, Peters.
Principal species: *D. incomtus* group.

Genus 25. ARVICANTHIS, Lesson.
Principal species: *A. niloticus* group (all named forms).

Genus 26. HADROMYS, Thomas.
Sole species: *H. humei.*

Genus 27. PELOMYS, Peters.
Principal species:
Subgenus *Pelomys*: *P. fallax* group.
Subgenus *Desmomys*: *P. harringtoni* group; (?) *P. rex.*
Subgenus *Komemys*: *P. isseli.*

Genus 28. LEMNISCOMYS, Trouessart.
Principal species: *L. barbarus* group; *L. striatus* group; *L. griselda* group.

Genus 29. RHABDOMYS, Thomas.
Principal species: *R. pumilio* and races.

Genus 30. HYBOMYS, Thomas.
Principal species: *H. univittatus* group; *H. trivirgatus* group.

Genus 31. MILLARDIA, Thomas.
Principal species: *M. meltada* group; *M. kathleenae* group; *M. gleadowi* group.

Genus 32. PYROMYS, Thomas.
Sole species: *P. priestleyi.*

Genus 33. DACNOMYS, Thomas.
Principal species: *D. millardi* group.

Genus 34. EROPEPLUS, Miller & Hollister.
Sole species: *E. canus.*

Genus 35. STENOCEPHALEMYS, Frick.
Sole species: *S. albocaudata.*

Genus 36. AETHOMYS, Thomas.
Principal species: *A. walambae*, *A. chrysophilus*, *A. kaiseri.*

Genus 37. THALLOMYS, Thomas.
Principal species: *T. namaquensis* group; *T. nigricauda* group.

Genus 38. RATTUS, Fischer.
Principal species:
Subgenus *Rattus* (classification based on that of Tate, 1936).
R. baluensis group; *R. macleari* group; *R. nativittatus* group; *R. blanfordi* group; *R. cutchicus* group; *R. canus* group, with *legatus*; *R. rattus* group, with *vicerex*, *tanezumi*, *gestri*; *R. norvegicus* group; *R. hoffmani* group; *R. concolor* group; *R. mülleri* group; *R. xanthurus* group, with *dominator*, *bontanus*, *everetti*, *luzonicus*, *bagopus*, etc.; *R. chrysocomus* group; *R. coelestis* group; *R. confucianus* group, with *huang*, *lepcha*, *fulvescens*, (?) *andersoni*, (?) *musschenbroekii*; *R. cremoriventer* group, with (?) *beccarii* (not seen); *R. whiteheadi* group; *R. baeodon* group; *R. lepturus* group; *R. elia* group; *R. bartelsi* group;

(*Rattus*) *R. rajah* group, with *surifer*, *hellwaldi*, *inflatus*, *moi*, etc.; *R. edwardsi* group, with *sabanus*, *vociferans*, etc.; *R. bowersi* group, with *mackenziei*; *R. berdmorei* group, with *manipulus*; *R. leucopus* group; *R. verecundus* group; *R. niobe* group; *R. tunneyi* group, with *melvilleus*, *culmorum*, *sordidus*, *colletti*, *conatus*, *woodwardi* and *villosissimus*; *R. fuscipes* group, with *assimilis*, *greyi*, *manicatus*, *mondraineus*, *vellerosus*, *velutinus*, and *lutreolus*.

Subgenus *Stochomys*: *R. longicaudatus* group.

Subgenus *Praomys*: *R. tullbergi* group.

Subgenus *Hylomyscus*: *R. aeta* group, with *stella*, *alleni*, etc.

Subgenus *Dephomys*: *R. defua* group.

Subgenus *Myomys*: *R. verreauxi* group (*albipes*, *brockmani*, *fumatus*, *daltoni*, *angolensis*, *shortridgei*, etc.).

Subgenus *Mastomys*: *R. coucha* group, (?) *R. pernanus*.

Subgenus *Micaëlamys*: *R. granti* group.

Subgenus *Ochromys*: *R. woosnami*.

Genus 39. GYOMYS, Thomas.

Principal species: *G. novaehollandiae*, etc.

Genus 40. LEPORILLUS, Thomas.

Principal species: *L. apicalis*, *L. conditor* (the last not seen).

Genus 41. PSEUDOMYS, Gray.

Principal species:

Subgenus *Pseudomys*: *P. australis* group.

Subgenus *Thetomys*: *P. nanus* group.

Genus 42. APOMYS, Mearns.

Principal species: *A. hylocoetes* group (including *datae*).

Genus 43. MELOMYS, Thomas.

Principal species:

Subgenus *Paramelomys*: *M. levipes* group.

Subgenus *Melomys*: *M. porculus group*; *M. cervinipes* group; *M. bruijnii* group.

Subgenus *Solomys*: *M. sapientis*; *M. ponceleti* (not seen).

(Classification based on that of Rümmler, 1938)

Genus 44. UROMYS, Peters.

Principal species: *U. neobritannicus* group; *U. caudimaculatus* group, with *anak*; *U. imperator* group, with *rex*.

Genus 45. COELOMYS, Thomas.

Principal species: *C. mayori* group.

Genus 46. MALACOMYS, Milne-Edwards.

Principal species: *M. longipes*, *M. edwardsi*.

Genus 47. HAEROMYS, Thomas.

Principal species: *H. margarettae*.

Genus 48. CHIROMYSCUS, Thomas.

Sole species: *C. chiropus*.

Genus 49. ZELOTOMYS, Osgood.

Principal species: *Z. hildegardeae* group.

Genus 50. Muriculus, Thomas.
Sole species: *M. imberbis*.
Genus 51. Hylenomys, Thomas.
Sole species: *H. callewaerti*.
Genus 52. Mus, Linnaeus.
Principal species:
Subgenus *Mus*: *M. musculus* group; *M. booduga* group, with *thai*, *pahari*, and others; *M. bufo* group, with *triton*; *M. minutoides* group, with *bellus*, etc.; *M. tenellus* group, with *deserti*.
Subgenus *Leggadilla*: *M. platythrix* group.
Genus 53. Mycteromys, Robinson & Kloss.
Sole species: *M. crociduroides*.
Genus 54. Leggadina, Thomas.
Principal species: *L. forresti* group; *L. delicatula* group.
Genus 55. Colomys, Thomas & Wroughton.
Principal species: *C. goslingi* and races.
Genus 56. Macruromys, Stein.
Principal species: *M. elegans* (not seen); *M. major*.
Genus 57. Nesoromys, Thomas.
Sole species: *N. ceramicus*.
Genus 58. Crunomys, Thomas.
Sole species: *C. fallax*, *C. melanius*.

(Specialized and distinct offshoots)

Genus 59. Lophuromys, Peters.
Principal species: *L. woosnami* group; *L. sikapusi* group, with *aquilus*, *flavopunctatus*, etc.
Genus 60. Notomys, Lesson.
Principal species: *N. longicaudatus* group; *N. mitchelli* group.
Genus 61. Mastacomys, Thomas.
Principal species: *M. fuscus*.
Genus 62. Golunda, Gray.
Principal species: *G. ellioti* and races.
Genus 63. Echiothrix, Gray.
Principal species: *E. leucura*.
Genus 64. Acomys, Geoffroy.
Principal species: *A. subspinosus* group; *A. cahirinus* group; *A. russatus*, *A. wilsoni*, and others.
Genus 65. Uranomys, Dollman.
Principal species: *U. ruddi* group (all named forms).
Genus 66. Bandicota, Gray.
Principal species: *B. bengalensis* group; *B. gracilis* group; *B. indica* group, with *savilei*; *B. gigantea* group.
Genus 67. Nesokia, Gray.
Principal species: *N. indica* and races.

Genus 68. BEAMYS, Thomas.
Principal species: *B. major*, *B. hindei* only.

Genus 69. SACCOSTOMUS, Peters.
Principal species: *S. campestris* group (all named forms).

Genus 70. CRICETOMYS, Waterhouse.
Principal species: *C. gambianus* and races.

Genus 71. PHLOEOMYS, Waterhouse.
Principal species: *P. cumingi*, *P. pallidus* only.

Named genera unrepresented in London include *Melasmothrix naso*, evidently near *Echiothrix*; *Lorentzimys nouhuysii*, evidently near *Rattus*; *Nilopegamys plumbeus*, evidently near *Rattus*; and *Limnomys*, *Tarsomys* and *Tryphomys*, all of which are probably not distinguishable from *Rattus*.

DISCUSSION

As regards the evolution of the Murinae, some authors appear to consider them offshoots of the Cricetinae, which have developed an extra (third) row of cusps on the upper molars. Hinton (Monograph of Voles and Lemmings, pages 122, 123, 1926) takes the view that the "Muridae, and indeed all the Simplicidentate Rodents, have descended from ancestors with brachyodont multi-tuberculate molars, in which the tubercles both in upper and lower molars were triserially arranged. . . . In the most primitive . . . Murinae, the transverse complication, occasioned by the triserial arrangement of the tubercles, is more completely preserved than in other subfamilies." It is not the purpose of this work to enter into an argument as to which of the two views is correct, but it should be stated that the view is here held that the Murinae present the most archaic branch of the family. It is suggested that their presence in Australia indicates that they are an extremely ancient group. The theory that a section of them evolved there, rather than it arrived there from Southern Asia as is usually accepted, is put forward in Volume I.

In an attempt to revise the genera into natural groups which can be keyed for identification purposes, a few words are necessary on certain characters which have been used. The presence or absence of the posterointernal cusp, T.7, in the first and second upper molars, has been used as a generic character. This cusp is present in such a comparatively small number of genera and species, that I think it must undoubtedly be used as an important generic character, even bearing in mind that occasionally it may appear in genera which are normally without it. When this occurs, the cusp in question is about to become suppressed, and is minute; but in genera here regarded as possessing the cusp, it is strong, well-developed, and not obliterated until old age, with the exception of the African *Grammomys* in which it is constantly present in the young, so far as I have seen, but always appears about to become suppressed.

I have also used as a generic character extreme reduction of the fifth finger, which occurs in some African genera as *Mylomys*, *Lemniscomys*, and *Pelomys*, until this finger loses its claw and apparently becomes vestigial. It may be argued that this is inconsistent as I have not retained genera like *Scarturus*

(Dipodidae), *Marmotops* (Sciuridae), and others, which are based on the absence or presence of a functionless digit. My reason for this is that in all *Scarturus*-like Dipodidae, i.e., in all specialized saltatorial members of the family, the digit which has become suppressed in "*Scarturus*" has long ceased to have any functional importance, and it appears that it is only a matter of time before the Allactaga Jerboas should lose both the functionless lateral digits; in "*Marmotops*" (with a minute thumb), as against *Marmota* (without a minute thumb), it is pointed out that nearly every living Squirrel except *Cynomys* is at the point of losing the thumb. But in Mice there appears no reason why the fifth finger should become so reduced as to be apparently valueless in a few genera, whereas in the vast majority of forms it is a well-developed functional digit. It is therefore in my opinion a valid generic character.

Many zoologists with whom I have had conversation appear to be of the opinion that there are far too many generic names which have been given to groups of doubtful value. The classification proposed here reduces many names to subgenera or synonymy; the only alternative is to give each specific group a generic name, which appears as unnecessary as it is inconvenient. For instance, in the genus *Rattus*, containing over three hundred forms as currently understood (and over five hundred as here understood), there are to be found types which appear very distinct from each other. At the same time these groups appear to be connected by forms which are intermediate in character. Tate, 1936, has divided the Indo-Malayan and New Guinea species into some fifteen specific groups; either each of these will have to receive a generic name, or many names, particularly African, which are currently accepted as full genera, and which are based on characters which in many cases occur over and over again in Indo-Malayan *Rattus*, will have to be synonymized with *Rattus* from which they were originally divided, as having no characters whatsoever to separate them from some branch or other of the genus *Rattus*, except the valueless character that they "come from Africa."

No name based on mammary formula is here retained, unless there is some very clear character that occurs with it that will separate it from *Rattus*. A glance at the table I have compiled when dealing with the genus *Rattus* (below) show that the formulas 3—3 = 12, 2—3 = 10, 3—2 = 10, 2—2 = 8, 1—3 = 8, 1—2 = 6, and 0—2 = 4, occur within this genus in forms that have never received a generic name. And how to base generic names on the mammary formulas of an assemblage such as this, with intermediates occurring from one extreme to the other, and different formulas occurring in a single specific group, is not clear. The number of roots of M.1 has also been used as a generic character for African *Rattus*. It must be stated, therefore, that typical *Rattus* has M.1 5-rooted, but it is by no means a constant character throughout Indo-Malayan *Rattus*; for instance, *Rattus rajah* has M.1 3-rooted, as in several groups of African *Rattus* which have received generic names.

The characters, or rather lack of characters, of all genera I have reduced to synonymy or subgenera, will be discussed fully below.

I have divided the subfamily into three generic groups, two of which contain a single isolated genus, *Eliurus* and *Anisomys* respectively, the third containing the whole of the remainder.

Winge, 1924, in his classification of the Order Rodentia, divides the whole of the Muridae into three major groups: Rhizomyini, Cricetini, and Murini. His first character, dividing his Rhizomyini from the rest, is "M.1 not or little larger than M.2" (and in this branch he includes *Rhizomys*, *Tachyoryctes*, and all Rats from Madagascar); whereas in the other subfamilies, M.1 has become larger than M.2.

While this character does not hold good, apparently, for all Cricetinae, it is an interesting fact to note that in all the Murinae, with two exceptions only, *Eliurus* (which may not belong in the subfamily, and is transferred here largely for convenience) and *Anisomys*, this character is present, and M.2 is always more reduced in elements than M.1, characterized by the invariable absence of the centre front cusp, T.2.

The ancestral Murine might be held to conform to the following hypothetical dentition: M.1 not larger than M.2, and M.3 not smaller (cf. *Eliurus*); all three rows of cusps of upper molars, including the posterointernal, fully developed, and probably with several subsidiary cusps present, as can be traced to-day in primitive forms as *Apodemus*, etc. Possibly an extra lamina anteriorly, as may be suggested in some species of *Mus*, and in *Leggadina*, in the first molar (according to Hinton, the primitive Murine contained molars with no less than seventeen tubercles); lower molars with all three rows of cusps fully developed (cf. *Hapalomys*), and probably with an extra lamina posteriorly, as in *Hyomys* and *Phloeomys* (corresponding to the "terminal heel" in most modern genera).

The loss of cusps and tendency towards laminate dentition in *Rattus* (many progressive species), *Uromys*, and others which are here called "simple-toothed" is here held to be specialization from such forms as *Thallomys* and many others in which the cusps are well developed and angular, in that it seems to be a step towards the complete simplification of molars found in some outlying families of Rodentia in which all ridges and cusps of the molars are lost, as Aplodontiidae, Geomyidae, Ctenodactylidae, Octodontinae. In Miller & Gidley's classification, in support of the view that this type of tooth is a highly specialized one, may be noticed that the primitive Aplodontoid family, the Allomyidae, Miocene, has a complex dental pattern, "the tritubercular structure of upper teeth evident in unworn crowns, protoconule and metaconule large functional cusps in M.1 and M.2, mesostyle appearing in hypsodont forms as a conspicuous median rib on outer surface of crown," etc., whereas the modern Aplodontiidae are noted as with "Cheekteeth growing from persistent pulp, the unworn cap showing evident pattern of *Allomys* type, this soon wearing away and leaving a simple enamel ring."

Taking the genera of Murinae one by one, we come first to the two genera in which M.2 has retained its primitive character, and is equal to M.1, both in size and elements, retaining a complete foremost lamina. These two genera are here each referred to a separate generic group.

Eliurus, if rightly referred to the present group, is the most primitive of the two, and the most isolated; in fact, it might form a separate subfamily within the Muridae. M.2 is as large as M.1, and M.3 has become in no way reduced, being as large as, or even larger than, M.2. The molars are a series of transverse plates, as occurs elsewhere in the subfamily in the genera *Nesokia* and *Phloeomys*; they appear to be cut in this condition. As in most Muridae from Madagascar (and in some from Africa), the jugal bone is long, and has not become much reduced. According to Tullberg, the tongue has three papillae circumvallatae, whereas in all other Muridae examined by this author, except *Gymnuromys* (Gymnuromyinae, also from Madagascar) and *Cricetomys* (Murinae), both of which have three, and *Tachyoryctes* (Tachyoryctinae) and *Myospalax* (Myospalacinae) (each with two), the number is one. That too much attention must not be paid to this character is indicated, however, by the fact that according to this author the Sciurine genus *Petaurista* has none, whereas in the closely allied *Pteromys* there are three. The few species of *Eliurus*, confined to Madagascar, appear closely allied to each other, and are rather Dormouse-like in external appearance.

Anisomys from New Guinea, here regarded as type of a separate generic group, should perhaps also be referred to a distinct subfamily from other Murinae. The characters of this extraordinary genus have in my opinion been greatly underrated. There is one species, *A. imitator*, from New Guinea. The greatest specialization of this Rat is the extraordinary formation of the lower incisors, which are so compressed that the width of the pair is equal only to that of one of the upper incisors, which appears unique in the whole Order, though the Neotropical Cricetine "Fishing-Rat" *Anotomys* possesses a suggestion of it. The toothrows are shortened in *Anisomys*; the palate is lengthened; the incisive foramina are extremely shortened, a rare character in the subfamily; the lower incisor root forms a prominent process on the mandible next to the condylar process, which is also a rare character in Murinae. The cheekteeth are never strongly cuspidate; in the adult they lose all traces of the original pattern, which appears to be considerably different from other Murinae examined. M.2, as already stated, is not reduced in elements, and has the front lamina complete. M.3 has here, however, become reduced, so that the genus is in this respect more progressive than *Eliurus*. The bullae of *Anisomys*, as in many Indo-Malayan and Australasian Rats, are much reduced. Externally, the size is relatively large, one of the larger members of the Murinae; the tail is poorly haired, with coarse scales; the hindfoot appears more or less arboreal.

The remaining genera agree in the character that the foremost lamina of M.2 is never complete.

They may be divided, partly for convenience, into three great sections: those retaining the posterointernal cusp and having no extreme specialization of molars, i.e., those in which no reduction of the main cusps has started; those without the posterointernal cusp of the upper molars, and without other specializations, containing the majority of the subfamily, and centring round the genus *Rattus*; and a certain number of extremely specialized (or generalized) aberrant genera which appear to have no near relatives, such as *Phloeomys*, *Saccostomus*, *Beamys*, *Cricetomys*, *Nesokia*, *Bandicota*, *Acomys*, *Uranomys*, *Lophuromys*, *Echiothrix*, *Golunda*, *Mastacomys*, and *Notomys*.

The first section contains forms in which there is a well-developed postero-internal cusp in M.1 and M.2, with the exception of *Grammomys* in which this cusp appears to be becoming suppressed, and *Mallomys*, in which the cusp is absent in M.1 and M.2, but very strong in M.3; a complex-toothed giant form referred to the present section for convenience. The genera with postero-internal cusp present divide broadly into small generalized Mouse-like types, with the cusps of the molars angular, strong and complex, showing no signs of simplification, and incidentally generally with a wide geographical distribution, and the specialized types which have retained this cusp, which are either with more or less simplified laminate molars in adult, or have some other specialization such as very large size, etc., and which have in each case a very restricted geographical distribution.

Of the more complex-toothed primitive types, HAPALOMYS appears to be in some ways the most generalized in that the lower molars have in M.1 and M.2 three rows of approximately equal-sized cusps, a feature unique in the entire subfamily, though the extra third row, at full development in *Hapalomys*, may be usually traced in most genera, and in two at least, *Pogonomys* and *Chiropodomys*, is comparatively quite well developed. The molars of *Hapalomys* have an appearance in general something like those of the African *Oenomys*, with the cusps all much raised up, which is according to Tullberg a modification towards vegetarian diet. The original front lamina of M.2 has in *Hapalomys* become almost obliterated, a rare feature in the group; usually one or even two cusps of this lamina remain; M.3 is reduced; the skull is of the arboreal type so often found in Indo-Malayan Muridae, which Mr. Tate has aptly defined as "Squirrel-formed"; the incisors are powerful, the bullae enlarged, and the hallux has become fully opposable, without claw, a highly specialized feature occurring in comparatively few genera. The range of the genus is Burma and Annam to Hainan; I have not seen the Hainan form, but all other named forms seem to belong to one species only. In connection with the suggestion that *Hapalomys* is an archaic type, it is interesting to note that Gregory (Orders of Mammals) considers that the primitive ancestral placental mammals were probably arboreal; certainly *Hapalomys* is one of the most specialized for arboreal life of all Rats.

POGONOMYS, from New Guinea, containing six forms (according to Rümmler's recent classification), arranged in two subgenera, *Pogonomys* and *Chiruromys*, is a very complex-toothed genus. Thus M.1 has ten cusps traceable, M.2 nine (only the centre front lamina being suppressed). The lower molars have the subsidiary (third) row very clearly developed, though not comparable to *Hapalomys*. The bullae are reduced; the incisive foramina rather short. The hindfoot is arboreal, but without a fully opposable hallux; the tail is naked and prehensile.

LENOMYS appears to be a generalized complex-toothed Rat confined to Celebes, with one or two valid species; apart from the presence of the postero-internal cusp, there is not very much to distinguish it from a complex-toothed *Rattus*. The molars are very angular; the palate is narrowed.

CHIROPODOMYS, with several named species all of which seem closely allied, ranging from Burma through Sumatra, Java and Borneo to the Philippine Islands, contains rather small Rats, with complex teeth, the subsidiary outer (third) row of the lower molars being about as *Pogonomys*, and a "Squirrel-formed" skull; the tail is said to be not prehensile (compare *Pogonomys*), but the hallux is fully opposable, and clawless. Pectoral mammae are suppressed.

VANDELEURIA is very closely allied to *Chiropodomys*, but the skull is a little less extreme, and the lower molars appear rather simpler; the feet are more specialized than *Chiropodomys*, in that D.5 of both manus and pes has lost its claw. The hallux appears to be fully opposable, also lacking a claw. This genus comprises a few species of small Tree-Mice, ranging through Peninsular India, north to Kumaon, south to Ceylon, and in Nepal, Tongking, and Siam.

It has been suggested to me that the Palaearctic genus MICROMYS is closely allied to *Vandeleuria*. It differs by the normally clawed fifth digit, the normal hallux, which is not fully opposable, and the prehensile tail. The genus contains one species of Pygmy Mouse ranging with its many races through most of Europe (including England), south of the Baltic, not including Spain, also Russia, parts of China, Japan, and Assam. The rostrum is much shortened.

Closely allied to *Micromys* is APODEMUS, a very large genus of Palaearctic Field-Mice, containing five well-marked specific groups; it differs from *Micromys* in the non-prehensile tail and the less-shortened rostrum. It is a generalized genus possessing no special peculiarity other than its well-marked posterointernal cusp, and complex teeth. It ranges across the Palaearctic region from Iceland and Ireland to Japan, and from Northern Europe and Asia south to Morocco, Persia, Kashmir, Nepal, and China south of the Yangtsekiang. Dentally the most primitive species group is the *mystacinus* group, from Asia Minor, M.1 and M.2, as in certain other complex-toothed genera, having four outer cusps. The *speciosus* group, from Eastern Siberia, China, Nepal, and Japan, tend to be about as complex dentally as a rule, but specialized in that the skull develops supraorbital ridges. The *sylvaticus* group, with a very wide range in Europe and Asia, has the molars normally a little less complex, usually with only three outer cusps in M.1 and M.2, but lacks supraorbital ridges. The *agrarius* group (Germany to China) has a somewhat more reduced M.3 than the last, rather simpler teeth than is usual in the genus, supraorbital ridges present on the skull, and often a mid-dorsal stripe present on the back, recalling some of the African striped genera, as *Lemniscomys* or *Rhabdomys*.

The African genus THAMNOMYS contains two groups of complex-toothed species, retaining a strong posterointernal cusp in the upper molars. The genus is more or less modified for arboreal life (though very much less highly so, as regards foot structure, than such types as *Hapalomys*, *Chiropodomys*, *Vandeleuria*, *Pithecheir*, and *Chiromyscus*). *T. rutilans* and allies have a more normal dentition; but in the *venustus* group, the cusps are much raised up, as in *Oenomys*. The skull is without special peculiarities. The range is chiefly Central African (Congo, Cameroons, Ruwenzori). GRAMMOMYS, which has a wide range in Africa south of the Sahara, contains a number of forms of more or less arboreal Rats, with very long tails; the posterointernal cusp is at the point of becoming suppressed, but is present and traceable in the young at least as a low connecting ridge. It is the only genus of the subfamily in which the cusp is constantly neither strongly developed nor suppressed. The feet appear less specialized than in *Thamnomys*, and certainly the dentition appears quite different, though some authors consider the genus should be referred to *Thamnomys*. The two genera are here considered as not of necessity very closely allied.

Several genera remain to be discussed in which the posterointernal cusp is retained in M.1 and M.2, but which possess either great external specialization in the form of their unusually large size, or in which the molars are relatively simple, and nearly laminate in the adult, with the cusps becoming suppressed, or in which the molars appear to be developing in a different way both from the generalized types just discussed, and from the majority of the group.

Carpomys from Luzon Mountains, Philippines, with two little-known species *melanurus* and *phaeurus* differing rather strikingly from each other in their development of incisors and molars, differs from other members of the section in that the posterior lamina of M.1 and M.2 and the anterior lamina of M.1 lower appear to be completely double. The cusps of the molars are obsolete in the adult. The external form is rather heavy, more or less arboreal, with a relatively well-haired tail; the hallux is not fully opposable; pectoral mammae are suppressed.

Batomys from the same area is essentially like *Carpomys*, but without the peculiar doubling of the laminae as just described. In both these forms, the zygomatic plate is strengthened in a manner reminiscent of that of the Microtinae.

Pithecheir, with one species from Java, Sumatra, and Selangor, appears to present dental characters which differ from the majority of the Murinae in that the whole of the outer row of cusps of the upper molars is disappearing, but the inner row, including the posterointernal cusp, is very strong, and there is a deep valley separating the centre and inner rows of cusps. The bullae are much enlarged. The hindfeet are much specialized for arboreal life, with hallux probably opposable, though evidently retaining a small claw in some cases.

Crateromys, with one species from Luzon Mountains, Philippines, appears to be developing dentally in very much the same way. The molars are strongly cuspidate and angular. M.3 is very little reduced. Apart from similarity in general dental arrangement, the genus differs very sharply from *Pithecheir*, and indeed from all known genera in a number of characters. The tail is thickly bushy, like that of a Squirrel, a most unusual if not unique character for a Rat. The size is very large indeed, it being one of the largest members of the whole group. The feet suggest modification for arboreal life, though they are not highly specialized. The fur is thick and long.

The skull has unusually narrowed and constricted frontals; the bullae are much reduced, the palate rather narrow. The zygomatic plate approaches the Microtine aspect of that of *Carpomys*.

Quite unrelated to the above is another form almost as large, Hyomys, with one species from New Guinea. The feet are more or less like those of *Crateromys*; but the tail is almost completely naked, and very sharply scaled; Thomas suggested that the large pointed scales of the tail were used to help the animal in climbing, like the caudal scales of *Anomalurus*. Pectoral mammae are suppressed. The molars are strongly hypsodont, but entirely different from

Crateromys; they are completely without cusps in the adult. The incisors are unusually broad and powerful. The bullae are very small, and the incisive foramina are much reduced. The skull is powerfully ridged, without excessive interorbital constriction. The genus appears quite isolated.

Remote from both of the last two, but paralleling them in its unusually large size, and very similar to the last in general external appearance is MALLOMYS, with one species from New Guinea, and perhaps another from Flores (which I have not seen). The molars are broad, strongly cuspidate and complex, in general pattern not unlike those of *Crateromys*, but stronger; only there is no posterointernal cusp in M.1 and M.2 in this genus. Oddly enough, this cusp is unusually prominent in M.3, to a degree which I have not seen in any other Rat which has the cusp reduced in M.1 and M.2 (in fact, when this cusp is suppressed in the first two molars, it seems always to be untraceable in M.3, excepting *Dasymys*). There is, however, little reduction in the outer row of the upper molars, which differs from *Crateromys*. The skull is extremely heavy, and the anterior part of the frontals is much inflated, as a consequence of which the infraorbital foramen appears narrowed. The bullae are reduced, the palate is narrowed, and the incisive foramina are somewhat short, though broad posteriorly, and specialized in shape. The tail is naked, and heavily scaly.

These three Giant Rats seem quite remote from each other and from all other genera of Murinae.

There remain to be discussed a few Australian genera in which the dentition is never strongly cuspidate in the adult, but in which a well-developed posterointernal cusp is present.

CONILURUS contains apparently two species groups from Australia with laminate molars (in the adult), a rather specialized skull, with the superior border of the zygomatic plate very strongly ridged, a vestigial coronoid process to the mandible, and a tendency for the outer row of the upper molars to become reduced and merge into the central row in adult. The tail is nearly uniformly haired, the size moderate.

LAOMYS appears to be very nearly allied, but the tail is uniformly haired and thickened at the base, the fur is crisp, and the molars of the few specimens in London, perhaps owing to age, appear almost plain laminate; this type of tooth was compared by Thomas to that of *Phloeomys*, but seems rather to suggest a much worn *Conilurus*-type of dentition.

ZYZOMYS contains one small species in which the outer row of cusps of the upper molars is strongly reduced, and the skull is a little less specialized than in *Conilurus*.

MESEMBRIOMYS contains two well-marked species of large Rats from Northern Australia; the molars show strong signs often of many small subsidiary cusps, which may also be present in other Australian genera; the frontals are more or less inflated, and the incisors are rather thicker than in *Conilurus*; but the zygoma appears more normal; the coronoid process is much reduced; the outer row of cusps in the upper molars tend to merge into the centre row. Pectoral mammae, so far as known, are suppressed.

The tail is relatively well haired, and very long. The four last genera are but little differentiated from each other, and also are probably nearly allied to a few Australian genera which will be dealt with in the neighbourhood of *Rattus*, but which have lost the posterointernal cusp, such as *Leporillus* and *Pseudomys*.

This concludes the list of the genera which normally have a posterointernal cusp present, except for *Beamys* and *Saccostomus*, which are so aberrant that I have placed them in the section of genera which are regarded as aberrant offshoots and are dealt with at the end of the subfamily; in these genera, cusp reduction has started, but it is the anterointernal cusp in M.1 that has become suppressed.

Turning to the more normal remaining Rats, it will be shown that a very large number of genera group themselves round *Rattus*, and their characters are overlapped by one section or other of that genus in many cases so that many of them are barely distinguishable from it.

The first three, *Oenomys*, *Mylomys*, and *Dasymys*, and the last four, *Colomys*, *Nesoromys*, *Crunomys*, and *Macruromys* (the latter two not well known), appear, however, to be very distinct from *Rattus*.

Oenomys, with a few closely allied named species from Central and Eastern Africa (Kenya through Congo to the Gold Coast and Angola), has much more powerful and exaggerated molars than any *Rattus*; all the cusps are raised up, and deep valleys separate the rows of cusps; the outer row of M.3 has become almost obliterated. The digestive organs are, according to Tullberg, more complicated than is normal. Externally the form is generalized. The group might be an offshoot of something like *Thamnomys venustus*.

Mylomys, from Eastern Africa, recently discovered also from the Gold Coast, and parts of the Congo, is another genus with extremely exaggerated dental pattern; M.3 has very much the same peculiarities as in *Oenomys* as regards the reduction of the outer row, and the whole of the centre row of cusps of the upper molars is unusually broadened and raised up. The upper incisors are grooved, and the external characters are much more specialized than *Oenomys* in that the fifth finger is almost suppressed, and the fifth hindtoe is very strongly shortened. The relationships of this genus are probably with *Pelomys* and *Arvicanthis*; also the Indian genus *Golunda* is in many characters similar, but appears to me to be much more abnormal in dentition, so that I have referred it to the section containing the genera which I think are very widely separated from normal Murinae, where it will be discussed later.

Dasymys, with a wide range in Africa south of the Sahara, but probably with only one valid species, is a rather isolated genus which appears to me to be most closely allied to the *Arvicanthis* series of Rats. The molars are quite different from *Rattus* in that there is an unusually large M.3, which tends to be very generally larger than M.2 to a slight degree, this character most noticeable in worn teeth, and in which the posterointernal cusp is originally present. The cusps of the molars are indeed unusually heavy in the young, but the molars appear to wear down almost immediately to a laminate pattern in which they are not or scarcely apparent. The anterior border of the zygomatic plate is concave, then sharply cut back above. The incisors are very broad, the palate is narrowed, the jugal is longer than is normal, and the frontals are extremely constricted, more so than is normal in the section. The external form is not much specialized.

Arvicanthis, which ranges over a large part of Africa from coast to coast, except in the extreme south, and occurs in Arabia, and as far north as Egypt, contains a large number of closely allied forms, presenting the following characters. The rostrum tends to be rather short, the frontals are strongly ridged, the incisors relatively thick, the zygoma powerful, the bullae rather large. The dentition is heavy, with broad molars, M.3 tending most often to be about as large as M.2, or very little smaller; the cusps originally powerful, but the molars tending to become laminate in age. The fifth digit of the hindfoot is strongly reduced, and scarcely longer than the hallux. The fifth finger is short, but not vestigial. The tail as a general rule is quite well haired. The fur is rough. This genus is connected very closely indeed with *Rattus* by the genus *Aethomys*.

Hadromys, based on a little-known species from Manipur, appears to stand very near *Arvicanthis*; the anterior border of the zygomatic plate differs in being concave (though this character may vary in other genera); apart from this, in our present knowledge of the genus, I can find no characters of importance to differentiate between the genera, though the details of dentition of *Hadromys* are not known, and all skulls examined lack the bullae.

Pelomys, from East, Central, and Southern Africa, is essentially like *Arvicanthis* in all respects except that the upper incisors are grooved, and the fifth finger is vestigial. In this I include, as a subgenus, the group referred by Thomas to *Desmomys*, which connects typical *Pelomys* with *Arvicanthis* very closely by having the incisors scarcely grooved, but has a more specialized M.3 than either apparently, and *Komemys*, containing small one-striped Rats from Lake Victoria and Congo.

Lemniscomys is a large genus containing three well-marked species groups based on colour pattern, which ranges over most of Africa, north to Morocco, and which is like *Arvicanthis*, but M.3 is more reduced, the fifth finger has lost the claw and appears functionless, and the zygomatic plate is relatively lower. A specialized striped or spotted colour pattern may occur.

Rhabdomys, containing the little Four-striped Rats of Kenya and South Africa, was formerly included in *Arvicanthis*, but has a lighter dentition than in that genus, and a smaller M.3; from *Rattus* it is not very clearly distinguishable, but the molars are more complex than is normal in that genus, and the outer digits of the hindfoot, and D.5 of the forefoot, are considerably shortened.

Hybomys is closely allied to the genera just dealt with, and also to *Rattus*, but differs from the latter in its molars, which are as a rule more angular than in that genus, and from the former in the shape of its skull, with unusually wide frontals, slender zygoma, etc. Two species groups, typified by *H. trivirgatus* and *H. univittatus*, occur in Central and West Africa; the former is a little more extreme in cranial and dental characters than the latter. The outer digits of the hindfoot are strongly shortened.

Millardia, from Ceylon and Peninsular India, north to Sind and the Punjab, contains three well-marked species each of which has received a generic name. It is one of the many genera which stand just outside *Rattus*, so to speak, and is not separable very satisfactorily from either that genus or those just dealt with. But the molars are strongly cuspidate, and not those of a *Rattus*; the fifth digit of the hindfoot is strongly shortened, and the plantar pads are reduced to 5 or 4. In *M. gleadowi*, the posterior nares are much narrowed, but this character may be present or absent elsewhere within a genus, as for instance African *Mus*. In *M. meltada*, the pectoral mammae are present, and the posterior palate is normal. In *M. kathleenae*, from Burma, the pectoral mammae are suppressed, but otherwise it is much like *meltada*.

PYROMYS, known by one specimen (?) from Sind, is a genus which I am doubtful about retaining. The external characters differ from *Millardia* in the six plantar pads, the much shorter ear, and the much shorter hindfoot, with fifth digit not shortened. On the other hand, the skull is so like that of *Millardia gleadowi* that one might suggest that the skin got mixed up with a skull of *M. gleadowi*. The hindfoot is too shortened for the genus *Rattus*; but the mammary formula strongly suggests certain Indian *Mus*, from which the teeth, if the skull really belongs to the skin, are totally different.

DACNOMYS is a genus from Sikkim, Assam, and Laos, containing probably one species of rather large Rat with heavy, angular molars, a longer toothrow than is known in *Rattus*, and very small bullae.

EROPEPLUS, with one species from Celebes, is doubtfully distinguishable from *Rattus*, but also seems to have a longer toothrow than is normal in *Rattus*; the bullae are less reduced than *Dacnomys*; I have seen only two specimens, which have been recently acquired by the Museum.

STENOCEPHALEMYS with one species from Abyssinia differs from *Rattus* by its unusually constricted frontals. It is a soft-furred high mountain species. The molars are rather angular in arrangement of cusps.

AETHOMYS stands very near *Rattus*, and very near *Arvicanthis*. M.3 is relatively large; occasionally it may be as large as M.2, as in *Arvicanthis*; the molars are heavy and complex as a rule; the bullae are large. Sometimes the anterior border of the zygomatic plate may be concave, but apparently this specialization is not yet fully developed, as it is not a constant character. The rostrum appears to be a little less shortened than is usual in *Arvicanthis*. Pectoral mammae may be suppressed. The outer digits of the hindfoot are strongly shortened. In this genus I include *chrysophilus*, *walambae*, *kaiseri*, and their allies, which have a wide range in Africa south of the Sahara, but not the *namaquensis* group, which is referred to THALLOMYS, a genus originally given generic rank mainly on character of the pattern of the lower molars, which I think may not divide it sufficiently from *Rattus* for the genus to be retainable; the external form is more or less modified for arboreal life, but not more so than in some species of *Rattus*; the molars are more complex than is usual in *Rattus*. The bullae are large. The range is African, southern and eastern.

RATTUS, containing thirty-five specific groups, at least, and about five hundred named forms, is an exceedingly difficult genus to define; as here understood it contains Rats without any extreme external specialization, and generally speaking with moderately simple molars, the cusps in the adult in a large section of the Indo-Malayan part of the genus being almost completely suppressed so that the animals become more or less simple-toothed, the type species and allies being moderately so, the molars in adult not showing great angularity of cusps.

The few relatively complex-toothed forms retained in the genus differ from the complex-toothed genera just dealt with in the structure of the feet, the outer digits being generalized, not shortened; among these may be mentioned *macleari* of Christmas Island, in which pectoral mammae are suppressed, a vestigial posterointernal cusp may be traced, and with a very naked tail; *nativittatus* from the same island, with an even more naked tail, no pectoral mammae, and the posterointernal cusp not visible in any seen; the *cutchicus* and *blanfordi* groups from Peninsular India, and the *canus* group from Sumatra, Java, Malacca, and Liukiu; also perhaps *andersoni* (Szechuan), and some members of the *xanthurus* group.

The *rattus* and *norvegicus* groups, which range owing to unintentional human introduction in almost all parts of the world, have moderately cusped molars, the cusps neither angular nor obliterated. The *concolor* group must be noted as very small for the genus, in size. Some mountain forms of *Rattus* develop unusually thick soft fur, among which may be noted the *chrysocomus* and *coelestis* groups from Celebes, in which the hindfoot is narrow, the rostrum is lengthened, and there are no pectoral mammae, and some Australian species. The fur may, on the other hand, be more or less densely spiny, as in many members of the New Guinea *leucopus* group. The smaller Rats of the Indo-Malayan area, such as the *confucianus*, *whiteheadi*, and *cremoriventer* groups, have generally nearly completely simple molars, and as a rule M.3 is more reduced, and the bullae are more reduced than in the type species and allies; *cremoriventer* group is considerably modified for arboreal life. Java possesses two rather aberrant small species in *lepturus*, which has a longer M.1 than is normal, very soft fur, and enlarged ears, and *bartelsi*, which has a much narrowed hindfoot, and rather less simple molars than in *lepturus*. The *rajah* group, containing relatively large Indo-Malayan Rats with small bullae, usually spiny fur, and rather specialized skulls, also as far as seen a three-rooted M.1, possess moderately simple *Rattus*-like molars, but differ from the majority of the species in that in most cases the outer digits of the hindfoot are shortened to a degree. The *edwardsi* group contains the largest species of the genus; also Indo-Malayan; with very small bullae, and relatively simple molars, M.3 being reduced to a certain extent. Sometimes the teeth may become within the genus strongly hypsodont, as in the Philippine species *luzonicus* and *bagopus*, and the Australian *lutreolus*; the latter belongs to a group of Australian Rats which have often rather unusually heavy molars, in some cases indeed being almost comparable to those of *Arvicanthis*, though on the whole with the cusps less angular than is usual in the African Rats allied to *Arvicanthis*. *R. verecundus* from New Guinea and allies parallels the Celebes *coelestis* group in cranial characters, though maybe a little more extreme, as in the narrowing of the zygomatic plate, and in the narrowed hindfoot. The Burmese *R. berdmorei* may be noted as a form with pro-odont incisors; apart from its immediate allies this character does not occur elsewhere in *Rattus*. The Australian *tunneyi* group possess unusually large bullae, in extreme development largest for the genus. All the African groups of *Rattus* have received generic names. *R. longicaudatus* appears nearest to typical *Rattus*, with laminate molars in the adult (though quite normally cusped in the young), and has a very naked tail. Most of the other African *Rattus* are small generalized forms, less specialized than the Indo-Malayan small Rats; *tullbergi* and the *aeta* group are most simple in dentition, the small Rats belonging to the *verreauxi* group are more complex-toothed. Some forms of the latter seem rather transitionary towards the genus *Mus*. The *coucha* group possess the feature that the mammae are as a rule variable in number, not separated into sets, and may be as many as twenty-four. *R. defua* is a West African type, slightly modified for arboreal life. By far the most aberrant form in dental structure is the South African *R. granti*, which has such unusually broad relatively complex molars, with a pattern which I have not seen elsewhere, that I think it should probably be referred to a genus distinct from *Rattus*. Finally, *R. woosnami* is a curious species with cranial, dental, and external characters all not typical of the genus *Rattus*, but which apart from its white tail seems to have no characters which will differentiate it clearly from all other groups. It comes from South-west Africa.

In Australia are a few genera which are probably quite distinct from *Rattus*, but which show very few characters to prove it. Least differentiated is Gyomys, a genus containing few species of small Mice, with normal dentition. Leporillus, of which few specimens have been seen, with two species, appears to be near *Conilurus*, but without the posterointernal cusp; the coronoid process of the mandible is vestigial, and the interorbital constriction is often more extreme than is the case usually in *Rattus*. Pseudomys, containing two subgenera *Pseudomys* and *Thetomys*, is another allied type; the anterior border of the zygomatic plate is concave; the interorbital constriction is in some cases extreme; the dentition is peculiar, and often the anteroexternal cusp in M.1 is vestigial, or in one form examined appears to be suppressed; in some forms, there is an extra front lamina on M.1, traces of which are not uncommon in many Australian genera.

Very doubtfully differentiated from *Rattus* are the mosaic-tailed Rats of North Australia and New Guinea, *Uromys* and *Melomys*, together with Apomys from the Philippines, which appears to be essentially like *Melomys*, but with a *Rattus*-tail. Melomys, containing many named forms, recently revised by Rümmler, and in which three subgenera *Paramelomys*, *Melomys*, and *Solomys* appear retainable, consist of generalized relatively small (as a rule) Rats with strictly simple teeth, no pectoral mammae, and tail more or less naked in the majority, though not always so. This type of tail may occur in *Rattus*, but so far as seen only in complex-toothed forms. Uromys is closely allied to *Melomys*, but with a greater number of palate ridges, so far as known, and with a longer palate. This genus, though connected closely by *Melomys*, appears distinct from *Rattus*. The teeth are always strictly simple, the bullae are minute. The palatal foramina are shortened, and the supraorbital ridges relatively weak. The size is large, and the tail always nearly completely naked. I follow Tate and Rümmler in referring the species *rex* and *imperator* from the Solomon Islands to the genus. The species *neobritannicus*, not seen, appears to differ from more typical *Uromys* in the presence of postorbital processes. In the *Uromys-Melomys* Rats, M.3 is usually strongly reduced.

Other genera closely allied to *Rattus* include COELOMYS, from Ceylon, differing apparently in having M.3 vestigial; MALACOMYS, from Central Africa, like a simple-toothed *Rattus* with small bullae and rather short toothrow, but the metatarsals said to be loosely joined, an adaptation to life in swampland; and HAEROMYS, with two species of Pygmy Mice from Borneo and Celebes with a proportionately long hindfoot, in which the hallux is said to be opposable, but retains its claw and does not look highly specialized.

CHIROMYSCUS, with one species from Burma and Annam, has, however, a fully opposable and clawless hallux, and is in this respect as fully specialized for arboreal life as *Hapalomys*, *Vandeleuria*, *Chiropodomys*, and *Pithecheir*.

ZELOTOMYS, containing a few closely allied named species from Eastern and Central Africa (extending to Angola), has rather complex molars, which appear broadened to a degree, and strongly pro-odont powerful incisors. M.3 is rather strongly reduced; the lower incisor root shows more on the mandible than is usual.

Osgood has suggested that this genus may be nearly allied to HYLENOMYS from the Congo, and MURICULUS from Abyssinia, two little-known genera with a *Mus*-type of dentition, but with pro-odont incisors.

MUS has been restricted by Miller to those forms in which M.1 is lengthened, with considerable or excessive distortion backwards of the anterointernal cusp, and M.3 strongly reduced often almost to vanishing-point. Although this type of dentition is in some of the less-specialized species rather little developed, so that an approach to some forms of *Rattus* is made, it is on the whole convenient and possible to retain the group distinct from *Rattus*. In *Mus* may be included the Palaearctic *musculus* group (*musculus* now ranging throughout the world as the result of artificial human distribution), the Indian *booduga* group, the Indian *platythrix* group (subgenus *Leggadilla*), with the "*Mus*-toothrow" less developed than in all others, and with supraorbital ridges developing on the skull; the African *bufo-triton* group, with the toothrow less specialized than the Pygmy African *minutoides* group, which are the most specialized dentally of the whole genus, and some forms of which, as *tenellus*, have unusually narrowed posterior nares. Often in the genus traces appear of what might be taken to be an extra lamina in front of M.1, this being most developed in some forms of the subgenus *Leggadilla*. The molars are in most cases in *Mus* quite heavily cuspidate. The genus does not seem to range naturally east of Siam, except that there is said to be a form in the Philippines (not seen). It appears to be represented in Java and Sumatra by MYCTEROMYS, containing one species which has a specialized *Mus*-type of dentition but differs in cranial characters, notably the narrowed zygomatic plate.

The Australian genus LEGGADINA, containing at least two groups of species, is interesting in that it seems to parallel *Mus* in dental characters as regards essential arrangement, but, as is often the case in Australian types, the molars are much simpler, less strongly cuspidate, and the whole of the outer row of cusps of the upper molars appears about to become obliterated. The species are very small as a rule. There is usually an extra lamina in front of M.1, or traces of it, and the inward distortion of the anterointernal cusp of M.1 is extreme (so far as seen).

Four other genera are more clearly distinct from *Rattus* than any of the above, and may be dealt with before we pass to the extremely aberrant and distinct genera; but three of these are very little known.

COLOMYS, from Kenya and Central Africa, is said to possess the character of *Malacomys*, in that the metatarsals are loosely joined as an adaptation to swamp-life. But unlike *Malacomys*, the hindfoot in this genus has become, so far as seen, much lengthened, being considerably longer than any *Rattus* or any member of the genera held above to be very closely allied to *Rattus*. The skull is specialized, with heavy braincase, enlarged infraorbital foramen, and narrow zygoma. The teeth are not unlike those of *Zelotomys*. The tail is poorly haired.

NESOROMYS, from Ceram, is not a well-known genus, but differs very sharply from all others of the section in the great broadening of the posterior palate, which is carried backwards far behind the toothrow. The infraorbital foramen is more enlarged than is usual. The palatal foramina are shortened. The external characters are normal.

CRUNOMYS, with two very little-known species from the Philippines, was referred to the Hydromyinae by Thomas, but there is too much doubt on this classification for it to be retained; the molars in the one skull available which is not worn out show a more Murine though simple-toothed pattern; the zygomatic plate is straight anteriorly, and much narrowed, as in Hydromyinae, and there appears to be scarcely any interorbital constriction present in the skull. The size is small; the fur may be spiny.

MACRUROMYS, a recently discovered genus with two species from New Guinea, also has a zygomatic plate very like that of the Hydromyinae; the toothrow is more strongly reduced than is normal in *Rattus*, and the pattern of the molars is, I believe, not quite normal, though I have only seen one specimen, which is too worn for detail notes; the bullae are very small; the tail is much longer than head and body, and almost completely naked (*M. major*). Tate evidently regards the genus as not far removed from *Rattus*.

Thirteen genera remain to be discussed, which appear to me to be very remote from all others in the subfamily, and, with certain exceptions (as *Nesokia* and *Bandicota*), are also very distinct from each other.

LOPHUROMYS, with several species from West, Central, and East Africa, appears to be an isolated type, and I can form no idea of its exact relationships. The interorbital region of the skull shows no constriction; the zygomatic plate is unusually low, being individually sometimes almost completely below the infraorbital foramen, and therefore little removed from the aberrant genus *Deomys*, though this is a rare feature; the molars, which are strongly cuspidate, appear to vary in essential pattern from specimen to specimen, so that some quite distinct dental patterns appear to me to be present even within a given species from the same area; even occasionally a small posterointernal cusp can be present; the incisors may or may not be slightly pro-odont; the jugal is usually relatively long. M.3 appears always to be considerably reduced. Typically the tail is strongly shortened, but in the *woosnami* group may be as long as the head and body. The fur is thick and of a peculiar quality; the outer digits of the hindfoot and D.5 of the forefoot are strongly shortened. The genus has in the past been referred to the Dendromyinae, but its molars are typically Murine.

NOTOMYS from Australia, containing two or three specific groups, is a highly specialized genus which is very likely an offshoot from something like *Pseudomys* or perhaps *Leporillus*; the hindfoot is extremely lengthened, usually more than a third of head and body length, much narrowed, and apparently fully specialized for saltatorial life. The plantar pads are reduced. The ears are rather large, the tail is long, and as a rule well haired, and the general form suggests that of a Jerboa or Kangaroo-Rat. The hallux is nearly vestigial, and D.5 is considerably shortened. The molars are not abnormal, and are rather simple; the anterior border of the zygomatic plate is concave, and the anterior zygomatic root is broadened. The bullae are large; the zygoma is narrow and rises rather abruptly anteriorly. A gular pouch on the throat may or may not be present.

Another highly aberrant Australian genus is MASTACOMYS, only known living from Tasmania. The skull strongly suggests that it has been derived from something like *Pseudomys*, but the molars are without parallel in the whole subfamily. The toothrows are extraordinarily broadened, so that the palate has almost ceased to separate them; the inner cusps of the upper molars are raised up and point sharply inwards; the centre ones are also thickened and raised up; the outer row is reduced. Considerable numerical cusp reduction has taken place here; the anteroexternal cusp is absent in M.1 (unique in the subfamily except one specimen seen of *Pseudomys*); this tooth has only six cusps (in the majority of Rats, there are eight); M.2 appears to have only five functional cusps; M.3 has no outer row, as in *Golunda* and *Mylomys*, but the tooth is rather less modified than in *Golunda*. In a young skull, the molars appear to be cutting in the same pattern as the adult. The frontals, as in *Pseudomys*, are extremely constricted, the anterior border of the zygomatic plate is concave. The fur is thickened, the tail short; externally the genus is reminiscent of some of the Cricetines of Patagonia.

GOLUNDA, containing one species the races of which range through a large part of India from the North-west Frontier, Nepal and Bhutan south to Ceylon, is another genus which has developed unusual enlargement of the cusps of the molars. It does not seem to have any near relatives, unless the African *Mylomys* is considered as one, but it appears to me to be much more extreme dentally than in *Mylomys*. The inner row of cusps has in this genus become unusually enlarged, as well as the centre row, particularly in M.2 and M.3; all traces of the outer row of M.3 are lost; with wear, M.1 actually seems to become the smallest tooth, and M.3 the largest. The upper incisors are grooved. The tail is relatively well haired; the outer digits of the hindfoot are reduced. The general form of the skull suggests the *Arvicanthis* or *Mylomys* type, to which branch of the subfamily it probably is most closely allied.

Acomys, containing many named forms from the plains and desert regions of Africa, south to the Cape, north to Morocco and Egypt, also from Crete, Cyprus, Syria, and Sind, is an isolated type, the chief character of which is the abnormal posterior palate, in which the mesopterygoid fossa is completely roofed in by bone; this formation is, however, suggested in *Pyromys*, *Mus tenellus*, and *Millardia gleadowi*, though much less developed in these forms. The fur in *Acomys* is always spiny. The jugal is long; the coronoid process of the mandible low. M.1 suggests the *Mus*-type to a certain extent; but M.3 is as a rule not very strongly reduced. In the South African species *subspinosus*, the molars appear much narrowed. The hindfoot is proportionately very short.

More than one author has considered the African genus Uranomys as a near ally of *Acomys*. The posterior palate is with the same abnormal specialization; but the genus differs from *Acomys* in the non-spiny fur, the pro-odont incisors, with the lower incisor root forming quite a prominent process on the mandible, and the strongly reduced outer digits of the hindfoot. The tail is rather short. M.3 is reduced. The genus ranges from Gambia to Uganda and Nyasaland; a few species are named.

Echiothrix from Celebes, with one or two species, is a highly aberrant and differentiated genus, possessing an abnormally elongated rostrum, very much like the Philippine genus *Rhynchomys*, but differing from that genus in having quite normal Murine molars, and strong incisors, instead of having all teeth vestigial. The lower incisors in the few skulls seen are widely separated from each other, so that it is difficult to see how they can function against the upper incisors. The external pterygoids are suppressed. The infraorbital foramen is large, the zygomatic plate narrow; the coronoid process vestigial. The lower incisor root forms a sharply defined process on the mandible. The skull is in fact specialized out of recognition when compared with any ordinary Rat. The tail is poorly haired, the fur nearly spiny, the size moderate.

The Bandicoot-Rats (*Nesokia* and *Bandicota*) appear to be very distinct from the above genera. Bandicota is the more primitive of the two. The incisors are broadened, and powerful; the lower incisor root forms a very prominent process on the outside of the mandible, which may tend in some cases to be nearly as high as the condylar process, and may be almost comparable to that present in *Rhizomys*. The cusps of the molars, though present in the young (and including a small posterointernal cusp), are quickly suppressed, and in the adult the pattern of the molars is more or less a series of straight transverse plates. The size may become large. The range is Indo-Malayan, from Kashmir south to Ceylon, east to Yunnan, Formosa, the Malay Peninsula, Sumatra, and Java. Four species groups are recognizable apparently, the most widely distributed of which are the "multimammate" *bengalensis* group, and the *indica* group, which are as a rule larger animals than the last.

Nesokia, with one species, races of which are chiefly Palaearctic in distribution (Lob Nor and Kashmir through Persia, South Russian Turkestan, to Syria and Egypt; in India south to Sind and Delhi), is like *Bandicota*, but a little more specialized ; the molars scarcely show any traces of cusps; the lower incisor root as a rule is more prominent on the mandible; the remnants of the original front lamina of M.2 appear to be suppressed; and the palatal foramina are shortened. The external characters of these two genera are without extreme abnormalities. The molars of this genus are approaching the highly specialized condition found in *Phloeomys*, which will be dealt with below.

Three unrelated African genera are noteworthy as possessing cheekpouches, together with the fact that the anterointernal cusp of M.1 is either suppressed or so vestigial that it is pushed backwards on to the second lamina. BEAMYS, with two little-known species from East Africa, is the most primitive. The cusps of the adult molars are strong and angular, so far as seen; there is a well-developed posterointernal cusp in M.1 and M.2 present and retained; but the anterointernal cusp is suppressed. The genus has been transferred to the Dendromyinae, but appears merely to be an aberrant genus of Murinae; for instance, M.3 is little reduced in *Beamys*, vestigial in Dendromyinae; the posterointernal cusp is strong in *Beamys*, suppressed in Dendromyinae, etc. The jugal is relatively long; the palatal foramina are strongly shortened. The tail is naked and long. The anterointernal cusp may have been suppressed as a result of the cheekpouches.

SACCOSTOMUS, with perhaps one species only, or perhaps a few closely allied ones, from Southern and East Africa, has evolved a similar dentition in essential arrangement to that of *Beamys*, there being no anterointernal cusp, but originally a posterointernal cusp retained, and M.3 is not strongly reduced. On account of the loss of the front cusp, this genus has also been referred to Dendromyinae, but seems to belong more in the present subfamily. Unlike *Beamys*, however, this is a simple-toothed Rat, as in the adult nearly all traces of cusps disappear, and the molars become more or less laminate. Well-developed cheekpouches are present. The jugal is relatively long. The tail is as a rule strongly shortened, which is an unusual character in the Murinae, though present in some species of *Lophuromys*. The hindfoot is proportionately very short.

CRICETOMYS, with probably one valid species only, races of which have a wide range in Africa south of the Sahara, shares with the two genera just dealt with the possession of large cheekpouches; here the molars have evolved in quite a different way from all other Murinae. There is no posterointernal cusp; the anterointernal cusp is also apparently modified by the cheekpouches but, instead of being suppressed, is vestigial, and pushed backwards, so that it never joins its neighbour on the centre row, but is immediately next to the centre cusp of the lamina behind, and in old age actually becomes merged into that lamina. All the inner cusps are correspondingly reduced and pushed backwards. M.2 is not much smaller than M.1, and M.3 is little reduced; various complexities can be traced in the molars of this genus. The bullae are much reduced; the skull is long and narrow; the incisive foramina are much shortened; the jugal is broad and long; the infraorbital foramen is larger than usual. As already noticed, Tullberg states that the tongue of this form possesses three papillae circumvallatae, differing from all other Muridae examined by him except forms from Madagascar. Externally, the size is very large indeed, at full development comparable to that of any of the Indo-Malayan and Australian Giant

Rats except *Phloeomys*. The tail is very long, not well haired, and is used by the animal as a sort of balancing organ when walking. According to Tullberg the stomach is complex. This appears to be a very isolated genus, totally different from all other members of the Murinae in many characters.

Lastly, PHLOEOMYS, with two species from the Philippine Islands, which is often referred to a distinct subfamily, is an unusually large type with well-haired tail, and feet of more or less arboreal type, with powerful claws; it is easily the largest member of the subfamily. The molars are a series of perfectly plain straight transverse plates, without the slightest traces of cusps in any examined (though I have seen no young specimens). The skull is powerfully ridged, and has large postorbital-like processes developed. The interorbital constriction is little marked; the braincase is reduced, the bullae are unusually small. The incisors are broad and powerful, and the infraorbital foramen is narrow. It is undoubtedly a very distinct type, but laminate molars are not unknown within the subfamily (cf. *Nesokia*), and I do not feel justified in referring it to a distinct subfamily. It seems to me to be, in fact, more allied to the majority of Murinae than is, for instance, *Anisomys*.

It must be stated that a few genera unrepresented at the British Museum, which will be noted below, cannot be included in the present discussion.

KEY TO THE GENERA OF MURINAE

(not including *Lorentzimys*, *Melasmothrix*, and a few other named genera not represented in London)

In the key which follows, it will be noted that in several cases there are exceptions to some of the characters given; or it is necessary to give alternative characters. This makes it appear that the key can be broken down many times. I would therefore remark that in a group like the Murinae, containing seventy-one genera, nearly a hundred and fifty specific groups, and just over fourteen hundred named forms, it is not possible at all times to define characters which will distinguish each genus from every other one. This is particularly apparent in the neighbourhood of the genus *Rattus*, the largest genus, which contains thirty-eight specific groups, and of which genus alone over three hundred forms have been examined. For every species which fails to conform to a given character and is marked as an exception in the key, there are very many indeed which will not be an exception to the given character.

M.2 not reduced, its front lamina complete, so that it is essentially like M.1 in elements.

Lower incisors deepened and so compressed that the width of the pair is equal to that of one of the upper incisors only; toothrow shortened; M.3 smaller than M.2. Lower incisor root forms prominent process on hinder part of mandible. (Group Anisomyes) 1. ANISOMYS

Lower incisors normal. Toothrow not specially reduced. M.3 at least as large as M.2, usually slightly larger. Lower incisor root not forming prominent process on hinder part of mandible. (Group Eliuri) 2. ELIURUS

M.2 reduced, its front lamina never complete, so that it is essentially different from M.1 in elements.

(Group Mures. The remainder of the subfamily)

Rostrum abnormally elongated. (Tips of lower incisors, in the specimens seen, widely divergent, and evidently not functioning against the upper incisors. External pterygoids suppressed.) 3. ECHIOTHRIX

Rostrum not abnormally elongated. (Usually, lower incisors without extreme peculiarities.) (All remaining genera)

Cheekteeth have lost or are losing all traces of cusps in the adult, the pattern a series of straight transverse plates. Incisors powerful, and skull considerably specialized.

Skull with supraorbital ridges forming a prominent postorbital process. Bullae extremely reduced. Lower incisor root forming no process on mandible. (No signs of cusps in molars of any specimen examined.) 4. PHLOEOMYS

Skull without postorbital process, but more or less modified for fossorial habits. Bullae relatively large. Lower incisor root forming extremely powerful process on mandible, this process often tending to be nearly as high as condylar process.

Cheekteeth usually or always without traces of cusps. Incisive foramina much shortened. Traces of original front lamina of M.2 normally suppressed. 5. NESOKIA

Cheekteeth usually with traces of cusps, at least in the young. Incisive foramina not much shortened. Original front lamina of M.2 not entirely suppressed. 6. BANDICOTA

Cheekteeth rarely losing all traces of cusps except in extreme old age, their laminae very generally curved (or if not, skull without the specializations described above). Process on mandible formed by lower incisor root moderate, weak or absent, but never tending to become as high as condylar process, and less developed than in *Nesokia* and *Bandicota*. Skull without conspicuous postorbital process (except in one species of *Uromys*, *U. neobrittanicus* (not seen)). (All remaining genera)

M.1 with its front lamina with anterointernal cusp (T.1) either suppressed or so vestigial that it is pushed backwards on to the lamina behind it, not joining the centre front cusp, but with age becoming merged in the second lamina. (Cheek-pouches present.)

Posterointernal cusp present and well developed in M.1 and M.2 in the young animal. Anterointernal cusp of M.1 entirely suppressed.

Cusps of adult cheekteeth strong and angular, the pattern evidently remaining complex. Palatal foramina shortened. Tail not reduced. 7. BEAMYS

Cusps of adult cheekteeth weak or obsolete, the pattern tending to become simpler and laminate. Palatal foramina normal. Tail strongly reduced. 8. SACCOSTOMUS

Posterointernal cusp of M.1 and M.2 absent. Anterointernal cusp of M.1 not suppressed, but vestigial, never joined to the central anterior cusp, and with wear becoming merged into the second lamina. (Incisive foramina shortened; jugal long; infraorbital foramen larger than is normal; giant form.) 9. CRICETOMYS

M.1 with anterointernal cusp always retained. All three cusps are present on front lamina of M.1 in all remaining, except *Mastacomys* and one specimen seen of *Pseudomys*, in which the anteroexternal cusp is suppressed. Anterointernal cusp never so vestigial that it is separated from the front lamina of M.1, and never becoming merged with wear into the second lamina. (All remaining genera)

First and second upper molars with a clear posterointernal cusp present and traceable until old age. (Genera numbers 10–26)

Lower first and second molars with three functional rows of approximately equal-sized cusps. (Hallux clawless and fully opposable.) 10. HAPALOMYS

Lower first and second molars never with three functional rows of approximately equal-sized cusps.

Tail thickly bushy, Sciurine. Frontals extremely constricted between orbits, this constriction carried far backwards, so that braincase appears shortened. (Giant form.) 11. CRATEROMYS

Tail never thickly bushy. Frontals with interorbital constriction less extreme in appearance.

Posterior lamina of first and second upper molars, and anterior lamina of first lower molar doubled. 12. CARPOMYS

Posterior lamina of first and second upper molars and anterior lamina of first lower molar single (normal), or with traces of extra lamina much less developed.

Hindfoot extremely specialized for arboreal life, with the hallux fully opposable, and clawless in adult (one specimen of *Pithecheir* seen, not adult, retains a minute claw on the hallux).

Outer row of cusps of first and second upper molars becoming reduced. Bullae strongly inflated.
13. Pithecheir

Outer row of cusps of first and second upper molars well developed. Bullae not noticeably inflated.

Lower molars with more conspicuous development of the subsidiary outer row of cusps. D.5 of manus and pes with claw (normal).
14. Chiropodomys

Lower molars with less conspicuous development of the subsidiary outer row of cusps. D.5 of manus and pes without claw. 15. Vandeleuria

Hindfoot less extremely specialized for arboreal life, the hallux clawed and apparently not fully opposable.

Upper molars strongly cuspidate, the outer row with the main cusps well developed, and usually forming a strong angle with their neighbours of the centre row; not tending to become fused with them.

Tail prehensile.

Tail naked. Palatal foramina considerably shortened (compare also *Thamnomys*). Bullae relatively smaller (compare *Micromys*). Palate not specially narrowed (compare *Lenomys*), and feet specialized for arboreal life (compare *Apodemus*). 16. Pogonomys

Tail moderately well haired. Palatal foramina not shortened. Bullae relatively larger (compare *Pogonomys*). Rostrum strongly shortened (compare *Apodemus*, *Lenomys*, *Thamnomys*). (Pygmy form.) 17. Micromys

Tail, so far as known, not prehensile. (Rostrum not specially shortened (compare *Micromys*).)

Palate much narrowed, particularly anteriorly. Tail more naked. (Feet not specially modified for arboreal life (compare *Thamnomys*).)
18. Lenomys

Palate not specially narrowed. Tail relatively well haired.

Feet noticeably broad, modified for arboreal life, and relatively shorter (about 18 per cent of head and body length on average).
19. Thamnomys

Feet noticeably narrow, not modified for arboreal life, and relatively longer (over 20 per cent of head and body length on average in about 300 specimens). 20. APODEMUS

Upper molars not or less strongly cuspidate, the outer row tending in most cases to become strongly reduced, and fused with the centre row (or if not, as *Hyomys*, all cusps more or less obsolete).

M.3 nearly as large as M.2. Coronoid process of mandible normal. Zygomatic plate straight anteriorly. Molars scarcely cuspidate in any seen.

Incisors very broad and heavy; palatal foramina strongly shortened; rostrum less pointed; tail naked; zygomatic plate lower. (Giant form.) 21. HYOMYS

Incisors not enlarged; palatal foramina long; rostrum more pointed; tail relatively well haired; zygomatic plate higher. 22. BATOMYS

M.3 clearly smaller than M.2. Coronoid process of mandible much reduced, low. Molars in most cases cuspidate at least originally (or if not, as perhaps *Laomys*, incisors moderate and tail fully haired, compare *Hyomys*, and zygomatic plate less specialized than in *Batomys*); zygomatic plate not straight anteriorly.

Tail thickened at base. 23. LAOMYS

Tail not thickened at base.

Frontal region of skull raised and inflated to a greater or lesser degree; zygoma not rising abruptly anteriorly, and relatively low. 24. MESEMBRIOMYS

Frontal region of skull not raised and inflated.

Zygoma rising abruptly anteriorly to considerable height. Tail nearly uniformly haired. 25. CONILURUS

Zygoma without special peculiarities; tail less well haired. 26. ZYZOMYS

No well-developed posterointernal cusp present and traceable through life in M.1 and M.2. (Remainder of subfamily.)

A much reduced posterointernal cusp in M.1 and M.2 appearing as a low connecting ridge, normally a feature of the dentition. (External form modified to a degree for arboreal life.) 27. GRAMMOMYS

A much reduced posterointernal cusp in M.1 and M.2 normally not a feature of the dentition. (This cusp is suppressed, so far as seen, except in a few individual cases in *Lophuromys*, in 5 out of 8 skulls of *Rattus macleari*, and in the only two skulls available of *Rattus baluensis*; these species not showing modification towards arboreal life, compare *Grammomys*.)

M.3 with well-developed posterointernal cusp. Frontal region of skull strongly inflated. (Cheekteeth angular, complex; giant form.) 28. MALLOMYS

M.3 with no well-developed posterointernal cusp (it may be traced in this tooth in *Dasymys*, cheekteeth losing cusps early, and frontals not inflated, compare *Mallomys*). Frontal region of skull not strongly inflated. (All remaining genera)

Mesopterygoid fossa roofed in by bone anteriorly.

Fur densely spiny; upper incisors not pro-odont; lower incisor root not showing on mandible; outer digits of hindfoot not shortened. 29. ACOMYS

Fur not spiny; upper incisors usually pro-odont; lower incisor root showing clearly on mandible; outer digits of hindfoot reduced. 30. URANOMYS

Mesopterygoid fossa not completely roofed in by bone anteriorly. (All remaining genera)

Cheekteeth much broadened, excessively heavy, the main cusps of the upper molars much raised up and thickened; so far as known, this peculiarity of dentition retained through life; the inner row of M.2 and M.3 becoming extremely enlarged, as is the centre row. Outer row of M.3 obliterated.

Upper incisors grooved. Braincase not shortened, and interorbital constriction less extreme. Palate relatively broader. (Outer digits of hindfoot and D.5 of forefoot strongly shortened. In old age, M.3 tends to become the dominant tooth.) 31. GOLUNDA

Upper incisors plain. Frontals extremely constricted, this constriction carried far back, so that brain-case appears shortened. Palate much narrowed. The anteroexternal cusp of M.1 is suppressed.
32. MASTACOMYS

Cheekteeth, in the majority, never approaching the above-described extreme type of heavy dentition; but if so (as *Mylomys*, *Oenomys* only), the antero-external cusp of M.1 is retained (compare *Mastacomys*), and the inner row of cusps in M.2 is not specially enlarged; and evidently in old age, M.3 does not tend to become the dominant tooth (compare *Golunda*).

Interorbital region of skull unusually broad, so that in superior aspect of skull there is scarcely any constriction apparent. (Toothrows set far forward in skull; zygomatic plate narrowed.)

Zygomatic plate tilted strongly upwards, its appearance about as in Hydromyinae. Cheekteeth, as far as ascertainable, with very weak cusps, the pattern nearly laminate. Outer digits of hindfoot not reduced. 33. CRUNOMYS

Zygomatic plate unusually low, sometimes scarcely tilted upwards at all. Cheekteeth with strong well-developed cusps, retained more or less through life. Outer digits of hindfoot shortened, D.5 scarcely longer than hallux.
34. LOPHUROMYS

Interorbital region of skull in superior aspect always with some constriction apparent.
(All remaining genera)

Posterior palate greatly broadened, and continued far backwards behind the toothrows. (Infra-orbital foramen more enlarged than is normal.)
35. NESOROMYS

Posterior palate not greatly broadened, and not continued far backwards behind the toothrows.

Toothrows strongly reduced (13·7 per cent or less of condylobasal length). (Zygomatic plate narrowed, strongly tilted upwards, in appearance like that of Hydromyinae.)
36. MACRUROMYS

Toothrows normally not extremely reduced. (An exception to this is *Rattus baeodon*, a little-known form which approaches *Macruromys* in this character; the zygomatic plate, though narrow, is not of Hydromyine type; but as *Macruromys* is represented in London only by one specimen with much worn teeth, I am unable to give further characters. Another species which might overlap *Macruromys* in toothrow length is *Malacomys edwardsi*.)

Upper toothrow becoming specialized by enlargement of M.1, combined with considerable or excessive backward distortion of the anterointernal cusp, combined with progressive reduction (in some cases almost to vanishing point) of M.3.

The outer row of cusps of the upper molars practically obsolete. 37. LEGGADINA

The outer row of cusps of the upper molars strongly developed.

Upper incisors not pro-odont.

Zygomatic plate narrowed; lower incisors lengthened, narrowed. 38. MYCTEROMYS

Zygomatic plate not specially narrowed. Lower incisors as a rule without peculiarity. 39. MUS

Upper incisors strongly pro-odont.

Mandible thin and weak, with ascending portion low; infraorbital foramen scarcely wider above than below; M.3 vestigial. (One specimen seen only.) 40. HYLENOMYS

Mandible normal, with ascending portion moderate; infraorbital foramen, as far as ascertainable, without special peculiarities; M.3 less vestigial. (One specimen seen only.) 41. MURICULUS

Upper toothrow not becoming specialized exactly in the manner described above. (All remaining genera)

Hindfoot extremely lengthened, usually more than 30 per cent of head and body length, and averaging, so far as ascertainable, over 34 per cent of head and body length; apparently fully specialized for saltatorial life. (Plantar pads reduced. Anterior border of zygomatic plate concave.) 42. NOTOMYS

Hindfoot less extremely lengthened, not averaging over 30 per cent of head and body length. (In only one genus, *Colomys*, does the foot length approach that of *Notomys*; anterior border of zygomatic plate not concave, and foot relatively shorter.)

Dentition heavier than is normal; cusps of all rows of upper molars enlarged and raised up to a considerable degree. Outer row of M.3 more or less obliterated.

Upper incisors grooved. Fifth digit of manus so shortened that there appear to be three functional digits only. 43. MYLOMYS

Upper incisors plain. Manus with four functional digits. 44. OENOMYS

Dentition less heavy, the cusps not or less exaggerated and enlarged. (All remaining genera)

Hindfoot much specialized for arboreal life, with the hallux clawless and fully opposable. 45. CHIROMYSCUS

Hindfoot less specialized for arboreal life, the hallux so far as known not fully opposable, and always retaining claw.

Upper incisors grooved. 46. PELOMYS

Upper incisors plain.

Upper incisors strongly pro-odont. The cheekteeth strongly cuspidate, complex, broad in appearance; toothrow about 18 or 19 per cent of condylobasal length. 47. Zelotomys

Upper incisors normally not pro-odont. If so (*Rattus berdmorei* group only), cheekteeth simple, relatively narrow, not strongly cuspidate; and toothrow shorter, about 14 to 16 per cent of condylobasal length.

Manus with fifth finger clawless and so shortened that there appear to be three functional digits only. 48. Lemniscomys

Manus with four functional digits.

Hindfoot elongated to a greater or lesser degree, the limbs slender, "the metatarsals loosely knit, to splay out on soft ground" (St. Leger).

Braincase rounded, heavy, much wider than rostrum; zygoma narrow; zygomatic plate narrowed; infraorbital foramen larger than is normal; upper cheekteeth broad, strongly cuspidate; hindfoot much lengthened, on average about 29 per cent of head and body length. 49. Colomys

Braincase less rounded, little wider than rostrum; zygomatic plate not narrowed; infraorbital foramen less enlarged;

upper molars narrow, with cusps obsolete; hindfoot averages about 24 per cent of head and body length. (Tooth-rows relatively short.)
50. MALACOMYS

Hindfoot as a rule not or less elongated, the metatarsals so far as known without the above described character. Hindfoot considerably less than 29 per cent of head and body (compare *Colomys*).

M.3 not or scarcely smaller than M.2, and with wear tending to become rather larger than that tooth (details of dentition of *Hadromys* are not known). Molars broad, and dentition heavy.

Zygomatic plate with anterior border not concave. (M.3 has originally no posterointernal cusp, and its posterior lamina is narrower than its anterior one. Outer digits of hindfoot strongly shortened (compare *Dasymys*). Rostrum short, and palate narrower (compare *Aethomys*).
51. ARVICANTHIS

Zygomatic plate with anterior border concave.

Skull with extreme interorbital constriction. Outer digits of hindfoot not reduced. (M.3 originally has posterointernal cusp present, and its posterior lamina is as a rule about as large as its anterior lamina (compare *Arvicanthis*). M.3 is most often larger than M.2.)
52. DASYMYS

Skull without extreme interorbital constriction. Outer digits of hindfoot strongly reduced. D.5 of manus much shortened. 53. HADROMYS

M.3 is normally clearly smaller than M.2, with very rare individual exceptions, as in some specimens of *Aethomys* (no extreme interorbital constriction (compare *Dasymys*), D.5 of manus usually less vestigial (compare *Hadromys*), and palate normally less narrowed, and rostrum usually relatively longer (compare *Arvicanthis*)).

(The remaining genera are distinguishable on average rather than absolute characters.)

Skull with extreme interorbital constriction (on average about 12 per cent of occipitonasal length), this constriction placed far back, so that braincase appears shortened. Anterior border of zygomatic plate not concave; zygoma relatively low anteriorly, not rising to considerable height. 54. STENOCEPHALEMYS

Skull in the majority without extreme interorbital constriction, only very occasionally less than 13 per cent of occipitonasal length; but if with this character, as sometimes in *Leporillus* and *Pseudomys*, either the zygoma rises abruptly anteriorly to considerable height (*Leporillus*), or the anterior border of zygomatic plate is concave (*Pseudomys*).

Molars always strictly simple (all cusps of each lamina merging into each other), and the cusps are never clearly marked (so far as seen, even when cutting); M.3 is strongly reduced. Pectoral mammae, so far as known, suppressed. Typically, the tail is almost devoid of hairs, the scales arranged in mosaic pattern, and typically not overlapping each other.

Posterior palate ending about on level with last molars, or slightly in front of that level. (Tail naked or poorly haired, as in *Uromys* normally); (incisive foramina as a rule less shortened; lower incisors less deep in proportion to their breadth; "palate ridges as far as known five or six" (Thomas).) 55. MELOMYS

Posterior palate ending slightly behind the last molars.

Tail naked. Bullae extremely reduced. ("Palate ridges where known twelve or more" (Thomas); incisive foramina always shortened; lower incisors deep in proportion to their breadth (compare *Melomys*).) 56. UROMYS

Tail moderately haired, not mosaic, but structure as in *Rattus*. Bullae less extremely reduced. 57. APOMYS

Molars not always strictly simple, but when so, tail relatively well haired, and pectoral mammae present so far as known. In forms without pectoral mammae, teeth not strictly simple;

tail most often not mosaic pattern, but with the scales overlapping to a greater or lesser degree, and usually moderately haired. (If the tail is mosaic pattern, the dentition is relatively complex.)

Pygmy Mice, with hindfoot on average more than 25 per cent of head and body length, so far as ascertainable. Head and body under 80 mm. (Hallux said to be opposable, but clawed.) 58. HAEROMYS

Head and body very rarely under 80 mm. in fully adult, but if so, hindfoot relatively shorter.

Toothrow relatively long, on average more than 21 per cent of condylobasal length.

Bullae about 16 per cent of occipitonasal length. Toothrow about 21·3–22·7 per cent of condylobasal length. 59. EROPEPLUS

Bullae about 11 to 12 per cent of occipitonasal length. Toothrow 21·6–23·3 per cent of condylobasal length. 60. DACNOMYS

Toothrow relatively shorter, very rarely more than 21 per cent of occipitonasal length. (Only in one case, of the remaining species, of those measured, is this percentage exceeded, in a specimen of *Rattus velutinus* (Tasmanian); which specimen gives a percentage of 21·4 per cent). (If this toothrow measurement is overlapped it will be in the Australian species of *Rattus* (bullae about 17–22 per cent of occipitonasal length, compare *Eropeplus*, *Dacnomys*), or in *Rattus lepturus*, which differs from these genera in its much larger ear, and in cranial details.) (*Eropeplus* must be noted as a little-known genus, of which we possess two old examples only.)

In the vast majority, the molars in fully adult are relatively simplified in structure, with the cusps on each lamina tending to fuse into each other to a greater or lesser degree, and not to form a sharp angle with each other (the molars may become completely simple). In species with relatively angular teeth, there is no strong reduction of the outer digits of the hindfoot. The hindfoot is normally not shortened, usually considerably more than 16 per cent of head and body length, always so on average in a group (compare *Pyromys*). The lower molars of species with angular dentition have usually the terminal heel of M.1 and M.2 well marked, and the cusps not specially raised up (compare *Thallomys*). If the outer digits of the hindfoot are relatively shortened (as in *Rattus rajah* group), the molars are simpler, and the cusps are not angular in the adult.

Anterior border of zygomatic plate concave.
61. PSEUDOMYS

Anterior border of zygomatic plate not concave.

M.3 vestigial, scarcely larger than posterior lamina of M.2. 62. COELOMYS

M.3 not or less vestigial.

Coronoid process of mandible usually well developed. 63. RATTUS

Coronoid process of mandible obsolete.

Frontals usually much constricted; zygoma rising abruptly anteriorly to a considerable height. 64. LEPORILLUS

Frontals not so strongly constricted; zygoma moderate, not much raised up anteriorly.
65. GYOMYS

Molars not becoming simplified in adult, the cusps well marked, angular, not tending to fuse with each other, and traceable until old age. These dental characters combined (except in *Thallomys*) with specialization or abnormality of foot structure; either with great reduction of outer digits of hindfoot, or with shortening of hindfoot. (In the case of *Thallomys*, the feet are not extremely modified; the genus differs from *Rattus* and those genera just dealt with on average characters of lower molars.)

D.5 of the hindfoot strongly shortened, often scarcely longer than the hallux, and scarcely reaching past base of D.4.

Frontals relatively wider, with interorbital constriction less marked; skull short and broad in general appearance; zygoma slender. 66. HYBOMYS

Frontals relatively narrower, normally constricted; aspect of skull not abnormal.

Rostrum relatively shortened, usually less than 30 per cent of occipitonasal length. Zygoma robust. (Posterior plantar pads much reduced in size; sometimes there are 5 only; back with four stripes.) 67. RHABDOMYS

Rostrum not specially shortened. (Back without stripes.)

Plantar pads of hindfoot reduced to 5 or 4. 68. MILLARDIA

Plantar pads of hindfoot, so far as ascertainable at present, 6. (This is so in specimens of *A. chrysophilus* and *A. walambae*, but no spirit specimens available of *A. kaiseri*.) Zygoma robust. 69. AETHOMYS

D.5 of hindfoot not shortened.

Hindfoot on average about 18 per cent of head and body length, as in many species of *Rattus*. Lower molars with terminal heel of M.1 and M.2 much reduced, and the cusps originally heavy and raised up. 70. THALLOMYS

Hindfoot strongly shortened about 16 per cent of head and body length. 71. PYROMYS

(A little-known form, only one specimen available for examination; its skull is so like that of *Millardia gleadowi* from the same area that one is tempted to believe that the skin was mixed with a skull of *M. gleadowi*.)

I doubt the validity of *Thallomys* from *Rattus* on the above-mentioned character of lower molars. The genus is retained mostly for convenience, though the molars are too angular for the genus *Rattus*. In *Thallomys* I include "*Aethomys*" *namaquensis*.

For the purposes of this work I have adopted the cusp notation of Miller (Cat. Mamm. West. Europe, 1912), as being the simplest and least likely to cause confusion. In this notation, in the upper molars, the three anterior cusps of M.1 are notated as T.1, T.2, and T.3; T.1 being the anterointernal and T.3 the anteroexternal. The second lamina possesses T.4 (internal), T.5 (central), and T.6 (outer). The third lamina T.7 (the posterointernal cusp, on the presence or absence of which many genera are named); T.8 (central) and T.9 (outer). Rarely, as in genera here held to be primitive, subsidiary cusps are present on the upper molars, particularly in some cases there is an extra cusp, which may be a trace of an extra (fourth) lamina, in front of M.1; also in complex-toothed genera, there is often an extra cusp at the back of the outer series in M.1. M.2 and M.3 are both derivable from the fully cusped pattern given above, though usually there are less cusps present. T.2 (the anterior centre cusp) is always absent in M.2, except in the genera *Anisomys* and *Eliurus*. Sometimes the whole front lamina of M.2 may be suppressed.

The lower molars are in the subfamily, with very few exceptions, in two rows of main cusps, the laminae in the molars being three in M.1, two in M.2, and two in M.3. M.1 and M.2 usually have a well-marked central posterior cusp at the back of the tooth, here referred to as the terminal heel; in a few cases this may become so broad as to appear as an extra lamina. The two front cusps of M.1 are often reduced and close together. The posterior lamina of M.3 often appears to consist of one cusp only. On the outer side of M.1 and M.2 lower are often some small subsidiary cusps, which may represent the remnants of an earlier complete third row of cusps; in the genus *Hapalomys*, the lower M.1 and M.2 have all three rows almost fully developed.

It must be noticed that many genera, such as *Muriculus*, *Hylenomys*, *Pyromys*, *Mycteromys*, *Nesoromys*, *Hadromys*, *Stenocephalemys*, *Laomys*, *Batomys*, *Pithecheir*, *Crunomys*, *Beamys*, and *Macruromys*, are very incompletely represented at the British Museum, and in some cases very incompletely known.

(The references and type localities to the list of named forms are the work of Mr. R. W. Hayman, except a small section of the genus *Rattus* and a few African genera, which are by Mr. G. W. C. Holt.)

The *Eliurus* Group (Eliuri)

Cheekteeth a series of transverse plates; these close together, as in laminate Murinae, not separated by inner and outer folds (compare laminate Cricetinae and Gerbillinae). M.2 as large as M.1, and with its elements not reduced; M.3 as large as M.2, with the same number of laminae. From Madagascar.

Genus. 1. ELIURUS, Milne-Edwards

1885. ELIURUS, Milne-Edwards, Ann. Sci. Nat. Paris, 63, ser. Zool. XX. no. 1 bis, p. 1.

TYPE SPECIES.—*Eliurus myoxinus*, Milne-Edwards.

RANGE.—Madagascar.

NUMBER OF FORMS.—Five.

REMARKS.—It is doubtful whether this genus has any close relationship with the Murinae, but I provisionally include it here as it seems to belong rather in the Murinae than in any other subfamily, and it does not seem to possess sufficient specializations to be referred to a distinct subfamily on its own. Whatever its relationships, I do not think it is a Cricetine, and it seems to me to be absolutely distinct and remote from all other Muridae from Madagascar. The genus has the molar series in transverse plates, as already indicated, but distinct in appearance from those of *Phloeomys*, *Nesokia*, or other Murinae with similar arrangement. They appear to be much nearer to these Murine types than to, say, *Irenomys* (Cricetinae), which has more or less laminate teeth, but the laminae are separated by conspicuous folds, as is normal for Cricetinae; while the Gerbilline *Meriones* agrees with the Cricetine type in this respect.

Further *Eliurus* lacks any modification of skull which is always present in Gerbillinae. I have therefore no alternative but to regard it as an archaic member of the Murinae.

CHARACTERS.—Skull with round broad braincase, no supraorbital ridges, rostrum long and pointed. Jugal long. Infraorbital foramen of Murine type, but relatively large; zygomatic plate nearly straight anteriorly. Incisive foramina variable in length, not extending to toothrow as a rule; either quite broad or quite narrow. Bullae of medium size. The laminae of each upper molar are three in number: M.2 essentially like M.1 both in size and form; M.3 at least as large as M.2, often slightly larger, and its posterior lamina may be double. Third lamina in M.1 and M.2 sometimes bent backwards in the middle, often larger than those in front of them, and may have an isolated island present. Lower teeth a series of transverse plates, three laminae on each tooth; the front lamina of M.1 may be double. The teeth appear to be cut in this flatcrowned condition, so the unworn crowns throw no light on the relationships of the genus.

Tail long, the end well haired, pencilled, but the portion joining the body more naked. Fur soft. Hindfoot more or less of arboreal type, with D.5 relatively long.

There seems no extreme difference between the named forms except that *minor* is constantly smaller than the others in the small series examined.

Forms seen: *majori*, *minor*, *penicillatus*, *tanala*.

List of Named Forms

1. ELIURUS MYOXINUS, Milne-Edwards

1885. Ann. Sci. Nat. XX, Art. 1 bis, p. 1.
Madagascar, West coast.

2. ELIURUS TANALA, Major

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 462.
Forest of the Independent Tanala of Ikongo, 30 miles south of Fianarantsoa, Madagascar.

3. ELIURUS MAJORI, Thomas

1895. Ann. Mag. Mat. Hist. 6, XVI, p. 164.
Ambolimitombo Forest, Central Madagascar.

4. ELIURUS PENICILLATUS, Thomas

1908. Ann. Mag. Nat. Hist. 8, II, p. 454.
Ampitambè, N.-E. Betsileo, Madagascar.

5. ELIURUS MINOR, Major

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 462.
Ampitambè Forest, N.-E. Betsileo, Madagascar.

The *Anisomys* Group (Anisomyes)

M.2 not smaller than M.1, and with elements exactly as in that tooth. Lower incisors so compressed that the width of the pair is equal only to that of one of the upper incisors, a character which appears unique in the whole Order.

Genus 2. ANISOMYS, Thomas

1903. Anisomys, Thomas, Proc. Zool. Soc. London, vol. 2, p. 199.

Type Species.—*Anisomys imitator*, Thomas.

Range.—New Guinea.

Number of Forms.—One.

Characters.—Skull with rather broad long rostrum, little interorbital constriction, weak supraorbital ridges which extend over the braincase; anterior part of zygomatic plate cut back above, not abnormal. Bullae extremely small. Posterior portion of palate square, extending considerably behind the much reduced toothrow. Incisive foramina extremely shortened, far in front of toothrows. Palate hollowed, the anterior part lying between two raised ridges.

Upper incisors of normal breadth; the lower ones extremely deep and as already indicated, abnormally compressed. Mandible with the ascending branch very high, the incisor root forming a conspicuous knob behind the coronoid process and in front of the condylar process. Angular portion with lower border prominently ridged.

In addition to the unique specializations of the incisors, the cheekteeth are widely different from any other member of the subfamily examined. They are laminate in adult (i.e., with cusps suppressed). M.1 and M.2 are both of equal size, and equal elements (this character not seen in any other member of the Murinae except *Eliurus*); there appear to be what might be considered traces of five laminae in both these teeth (though according to Rümmler's figure, 1938, this is not the case). The anterior lamina seems to represent the three original cusps, both in M.1 and M.2; the second lamina is similar; the third lamina has between it and the second one traces of a large cusp on the inner side; and behind the last lamina is a large terminal cusp or heel on the outer side. M.3 is smaller than M.2, evidently trilaminate, with the posterior lamina the smallest. The terminal heel is well developed in the first two lower molars, more or less appearing as a fourth lamina in M.1. M.1 and M.2 upper are three-rooted.

Mammae 1—2 = 6. Tail long, with large scales, but with a moderate growth of hair visible, at any rate as compared with such types as *Hyomys*. Hindfoot more or less of arboreal type; D.4 appears slightly the longest digit; D.5 relatively long. The claws are large; the hallux not shortened. Forefoot with D.4 and D.3 subequal and longest, D.2 considerably shorter, D.5 shortest. Fur rather coarse. Ear short. Size large; head and body up to 279 mm. or perhaps more.

I should be much more ready to separate this genus as type of a subfamily than any other genus I have included in the Murinae, *Eliurus* excepted.

Forms seen: *imitator*.

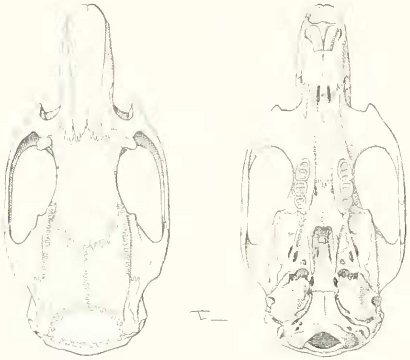

FIG. 1. ANISOMYS IMITATOR, Thomas.
B.M. No. 5.11.28.11, ♂; × 1.

FIG. 2. ANISOMYS IMITATOR, Thomas.
B.M. No. 5.11.28.11, ♂; × 1.

List of Named Forms

1. ANISOMYS IMITATOR, Thomas
1903. Proc. Zool. Soc. London, II, p. 200.
Aroa River, British New Guinea.

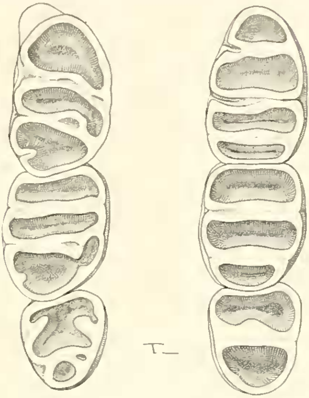

Fig. 3. Anisomys imitator, Thomas.
Cheekteeth: B.M. No. 5.11.28.11, ♂; × 7.

Group *Mures*

This includes the remainder of the subfamily. M.2 is always smaller than M.1, or with its elements reduced and with fewer cusps than in M.1.

The following genera (to *Mesembriomys*) have the posterointernal cusp present and usually clear in M.1 and M.2, or sometimes in all three upper molars, excepting *Mallomys*, in which the cusp is suppressed in M.1 and M.2, but unusually strong in M.3.

Genus 3. HAPALOMYS, Blyth

1859. Hapalomys, Blyth, Journ. Asiat. Soc. Bengal, XXVIII, p. 296.

Type Species.—*Hapalomys longicaudatus*, Blyth.

Range.—Indo-Malayan: Tenasserim, Annam, Laos, and Hainan.

Number of Forms.—Three.

CHARACTERS.—Skull of "arboreal type" in general formation; braincase very broad; interparietal much enlarged in the few skulls seen; rostrum short. Supraorbital ridges upstanding and prominent. Anterior border of zygomatic plate straight; zygomatic plate high and strong. Infraorbital foramen narrow. Zygoma robust. Palate relatively narrow. Bullae large. Incisive foramina of medium length, without special peculiarities.

Incisors considerably broadened, powerful.

Cheekteeth abnormal; upper molars with the cusps raised, of the *Oenomys* type, but the inner and outer row with the cusps nearly as large as those of the centre row, the rows of cusps regular and straight, the valleys between them deep. M.1 with nine well-developed cusps (including the posterointernal). M.2 with only T.4, 5, 6 and T.7, 8, 9, the front lamina being suppressed altogether except for minute vestiges, which is an uncommon feature in the subfamily. M.3 reduced, with T.4 and 5 representing the original second lamina, and one central cusp behind them; these being the sole main elements of the teeth. M.1 apparently five-rooted.

Lower molars: M.1 and M.2 each with three rows of nearly equal-sized cusps, this feature so far as I have seen unique in the subfamily, though *Chiropodomys* and *Pogonomys* approach it to a certain extent. M.1 has the first lamina with two main cusps only; the second and third lamina of this tooth, and both laminae of M.2, each with three well-developed cusps; M.3 with two laminae, each with two cusps only.

Fur thick and soft. Tail longer than head and body, moderately haired, sometimes pencilled terminally. Hindfeet much specialized for arboreal life; digit pads large; D.4 with longest digit in the few seen; D.5 nearly as long as D.2; hallux extremely wide, without claw, and fully opposable.

Mammae 2—2=8 (Wroughton).

The presence of three equally developed rows of cusps on the lower molars may be an archaic character. It is interesting to note that, as is often the case in primitive, relict genera, considerable specializations are present, as the general form of the skull, and the opposable hallux.

Forms seen: *delacouri*, *longicaudatus*, *pasquieri*.

The latter, based on a very young specimen with all the molars not fully cut yet, is best regarded as a synonym of *delacouri*. I do not think there is more than a racial difference between any of the forms examined; I have not seen the Hainan form.

LIST OF NAMED FORMS

1. HAPALOMYS LONGICAUDATUS LONGICAUDATUS, Blyth

1859. Journ. Asiat. Soc. Bengal, XXVIII, p. 296.
Sitang River, Tenasserim.

2. HAPALOMYS LONGICAUDATUS DELACOURI, Thomas

1927. Proc. Zool. Soc. London, p. 55.
Dak-to, Annam.
Synonym: (?) *pasquieri*, Thomas, 1927, Proc. Zool. Soc. London, p. 57.
Zieng Khouang, Laos.

3. HAPALOMYS MARMOSA, G. M. Allen
1927. Amer. Mus. Nov. 270, p. 12.
Near Nodoa, Hainan.

Genus 4. POGONOMYS, Milne-Edwards

1877. POGONOMYS, Milne-Edwards, Comptes Rendus, Paris, LXXXV, p. 1081.
1888. CHIRUROMYS, Thomas, Proc. Zool. Soc. London, p. 237. *Chiruromys forbesi*, Thomas. Valid as a subgenus.

TYPE SPECIES.—*Mus* (*Pogonomys*) *macrourus*, Milne-Edwards.

RANGE.—New Guinea and adjacent islands, Japan, New Britain, Ferguson Island, Goodenough Island.

NUMBER OF FORMS.—As revised by Rümmler, 1938, only six are recognized.

CHARACTERS.—Skull with interorbital constriction apparent, and with rounded braincase; supraorbital ridges as a rule well developed. Rostrum long (*P. sylvestris*) to short (*P. forbesi* and others). Zygomatic plate and infraorbital foramen nearly of the specialized type found in *Crateromys*, but infraorbital foramen less narrowed than in that genus. Zygomata widely spreading. Bullae very small. Palate broad; incisive foramina shortened, and considerably in front of toothrow. Incisors usually broad and rather powerful.

Upper molars complex; the centre row of cusps the largest, but neither the inner nor the outer rows showing much sign of reduction. M.1 with ten cusps, including a strong T.7, and an extra outer posterior cusp; M.2 with nine cusps (only T.2 is suppressed); M.3 not much smaller than M.2, mostly trilaminate, and with no clear outer row. The pattern is evidently traceable even in old age, and wears down slowly. A small extra front cusp in front of foremost lamina of M.1 may be present. Lower teeth like *Chiropodomys*, the outer subsidiary row of cusps very clear, nearly developing as an extra row, though not comparable to *Hapalomys*.

Mammae 1—2 = 6. Tail long, nearly naked, the hairs more or less vestigial; the tail of *Chiruromys* was described by Thomas as with the "terminal portion above without scales, quite naked, transversely wrinkled, and obviously prehensile. The scales of the rest of the tail not, as is usual, square or arranged in distinct rings, but more or less pentagonal or lozenge-shaped, and set in diagonal slanting series, somewhat like the dorsal scales of a snake." Hindfoot broad, of arboreal type, with the fifth digit elongated, but the hallux not opposable, or not fully so and bearing claw. Manus with D.2 rather shortened sometimes. Fur soft.

Forms seen: *dryas*, *forbesi*, *lepidus*, *lamia*, *loriae*, *mambatus*, *macrourus*, *pulcher*, *silvestris*, *vates*, *vulturnus*.

Both Tate and Rümmler have recently offered a classification of this genus. I find that British Museum material agrees in nearly every character with that of Rümmler, while I have not been able to agree in every case with the arrangement of Tate. Rümmler's classification is therefore here adopted. Many nominal forms have been reduced to synonym, which perhaps in some cases may stand for local races.

Rümmler gives roughly the following characters for the subgenera:

Subgenus Pogonomys: Scales on the tail mosaic-formed, the apical edges not free and not jutting over the scales of the next row. Premaxillar region of skull lower and longer (i.e., not "Squirrel-formed" as discussed and figured by Tate, Bull. Amer. Mus. Nat. Hist. LXXII, VI, p. 614, 1936). Palatal foramina wider posteriorly than anteriorly. Molars as a rule simpler, and M.3 more reduced posteriorly, the fourth transverse row merged with the third.

With species *macrourus*, *sylvestris* and *mollipilosus*. (Rümmler synonymizes *lepidus* with *macrourus*, the genotype; but according to Tate there is some doubt as to the status of the name *macrourus*. Rümmler further regards the names *loriae* and *dryas* as synonyms of *mollipilosus*.)

Subgenus Chiruromys: Scales of the tail with apical edges mostly formed into a rounded point, which juts over the scales of the next row (and terminal portion more developed, as described by Thomas (noted above)). Premaxillar region of skull shorter (i.e., "Squirrel-formed" as figured by Tate, rostrum shortened, and zygomata more spreading); palatal foramina not narrowed in front; molars tending to be more complex, and fourth transverse row of M.3 usually not merged into third row.

With species *forbesi*, *lamia*, and *vates*.

For further characters of species see Rümmler, 1938, Die Systematik und Verbreitung der Muriden Neuguineas (Mitt. Zool. Mus. Berlin, 23, p. 57).

List of Named Forms

Subgenus *Pogonomys*, Milne-Edwards

1. POGONOMYS MACROURUS, Milne-Edwards

1877. C. R. Acad. Sci. Paris, LXXXV, p. 1081.
Arfak, New Guinea.
Synonym: *lepidus*, Thomas, 1897, Ann. Mus. Genova, 2, XVIII, p. 614. Haveri, Astrolabe Range, New Guinea (status *fide* Rümmler).
lepidus huon, Tate & Archbold, 1935, Amer. Mus. Nov. 803, p. 6. Huon Peninsula, Dutch New Guinea (status *fide* Rümmler).
lepidus derimapa, Tate & Archbold, 1935, Amer. Mus. Nov. 803, p. 6. Mount Derimapa, Dutch New Guinea (status *fide* Rümmler).

2. POGONOMYS MOLLIPILOSUS, Peters & Doria

1881. Ann. Mus. Genova, XVI, p. 698.
Katou, Oriomo River, Daru, S. New Guinea.
Synonym: *loriae*, Thomas, 1897, Ann. Mus. Genova, 2, XVIII, p. 613. Haveri, Astrolabe Range, Central British New Guinea (status *fide* Rümmler).
dryas, Thomas, 1904, Nov. Zool. XI, p. 600. Dinawa, Owen Stanley Range, New Guinea (status *fide* Rümmler).

3. POGONOMYS SYLVESTRIS, Thomas

1920. Ann. Mag. Nat. Hist. 9, VI, p. 534.
Rawlinson Mountains, New Guinea.

Subgenus *Chiruromys*, Thomas

4. POGONOMYS FORBESI, Thomas

1888. Proc. Zool. Soc. London, p. 239.
Sogere, S.-E. New Guinea.
Synonym: *forbesi vulturnus*, Thomas, 1920, Ann. Mag. Nat. Hist. 9, VI, p. 535. Milne Bay, S.-E. Papua.
forbesi mambatus, Thomas, 1920, Ann. Mag. Nat. Hist. 9, VI, p. 536. Kokoda, Mambare River, N.-E. New Guinea.
forbesi satisfactus, Tate & Archbold, 1935, Amer. Mus. Nov. 803, p. 7. Goodenough Island, D'Entrecasteaux group.
pulcher, Thomas, 1895, Nov. Zool. II, p. 164. Fergusson Island, D'Entrecasteaux group (status *fide* Rümmler).
pulcher major, Tate & Archbold, 1935, Amer. Mus. Nov. 803, p. 8. Goodenough Island, D'Entrecasteaux group (status *fide* Rümmler).

5. POGONOMYS LAMIA, Thomas

1897. Ann. Mus. Genova, 2, XVIII, p. 615.
Ighibeiri, Upper Kemp Welch River, Central British New Guinea.

6. POGONOMYS VATES, Thomas

1908. Ann. Mag. Nat. Hist. 8, II, p. 495.
Madeu, Upper St. Joseph's River, Central district, British New Guinea.

Genus 5. LENOMYS, Thomas

1898. Lenomys, Thomas, Trans. Zool. Soc. London, XIV, p. 409.

Type Species.—*Mus meyeri*, Jentink.

Range.—Celebes.

Number of Forms.—Three.

Characters.—Skull like that of a specialized *Rattus*; supraorbital ridges very prominent, forming small postorbital-like projections. Anterior part of zygomatic plate more or less straight; infraorbital foramen rather narrow. Incisive foramina short. Bullae large and inflated, though less so than in some *Rattus*. Palate much narrowed, particularly anteriorly.

Molars complex, the centre row of cusps large, the inner and outer rows also strong, well developed. Nine main cusps in M.1; eight in M.2 (T.2 only suppressed); M.3 trilaminate, nearly as large as M.2, the cusps in the few skulls seen not clear. Teeth heavy; the rows of cusps forming sharp angles with each other. Lower molars with outer subsidiary cusps developed, the main cusps forming sharp angles with each other, the terminal heel of M.1 and M.2 well developed.

Fur thick and soft. Mammae "apparently 0—2=4" (Tate). Tail relatively long, very poorly haired.

In this genus Tate includes, provisionally, the species *callitrichus*. The few skulls bearing this name in London may be wrongly identified; they certainly agree with *Rattus* in all respects, and do not belong to the present genus.

The type of tooth found in this genus would lead into the more complex-toothed species of *Rattus* (as *legatus*, *macleari*, etc.), if the posterointernal cusp were suppressed.

The type is a large Rat, measuring up to 290 mm. in adult.

Forms seen: *meyeri*.

List of Named Forms

1\. LENOMYS MEYERI MEYERI, Jentink

1878\. Notes Leyden Museum, 1, p. 12.
Menado, North Celebes.

2\. LENOMYS MEYERI LAMPO, Tate & Archbold

1935\. Amer. Mus. Nov. 803, p. 5.
Mt. Lampobatang, S. Celebes.

3\. LENOMYS LONGICAUDUS, Miller & Hollister

1921\. Proc. Biol. Soc. Washington, XXXIV, p. 95.
Gimpoe, Middle Celebes.

Genus 6. CHIROPODOMYS, Peters

1868\. Chiropodomys, Peters, Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 448.

1934\. Insulaemus, Taylor, Philippine Land Mammals, p. 469. *Insulaemus calamianensis*, Taylor. Not seen. For lack of distinguishing characters from *Chiropodomys* see Tate, Bull. Amer. Mus. Nat. Hist. LXXII, VI, p. 632, and fig. p. 631.

Type Species.—*Chiropodomys penicillatus*, Peters.

Range.—Indo-Malayan: from Assam, Burma, Siam, Annam, to Sumatra, Java, Borneo and Calamianes Island, Philippines. Yunnan.

Number of Forms.—About nine.

Characters.—(This genus is very closely allied to *Vandeleuria*, and appears also to present some relationship towards *Pogonomys*.) Skull with extremely heavy broad rounded braincase, and relatively short rostrum, of the arboreal type of *Chiruromys*. Some interorbital constriction noticeable. Supraorbital ridges traceable, sometimes strong. Interparietal broad and large. Anterior part of zygomatic plate straight. Zygoma rather narrow. Skull slanting downwards posteriorly to a degree, behind posterior zygomatic root. Palate broad. Incisive foramina wide, short, not extending to toothrows. Bullae relatively small. Upper molars rather narrow, the pattern complex. Nine main cusps are present in M.1, the centre cusps larger than the inner and outer rows. M.2 may have seven or eight main cusps according to the development of T.3, which apparently varies; T.2 as usual is suppressed. M.3 noticeably narrow and considerably reduced, with the outer row suppressed. In M.1 and M.2, however, the outer row is strong. M.1 and M.2 originally have four outer cusps. A specimen examined has a three-rooted M.1. Lower teeth complex; the usual elements present, but the outer subsidiary row normally unusually well developed, the young animal almost has the appearance of having three rows. The usual "outer row," which represents probably the original or archaic centre row, appears to be nearer the middle of the tooth than is usual. In this character the genus is not much less primitive than *Hapalomys*.

Mammae 0—2 = 4. Hallux opposable, but tail not prehensile, so far as known. The tail is considerably longer than the head and body, relatively well haired, and more or less pencilled terminally. Hindfoot much modified for arboreal life, with enlarged digit pads; D.5 clawed, nearly as long as D.2; hallux short, without claw, fully opposable. D.5 of manus with claw, pollex appearing as a widish knob, less reduced than is usual.

Forms seen: *anna*, *gliroides*, *legatus*, *major*, *pictor*, *pusillus*, "*peguensis*."

The status of these forms is not clear. For the most part they stand now as distinct species; but I think that if a representative number were collected, all would be referable to *gliroides* as races. The differences are mostly in size, varying from *legatus* (head and body 133) to *pusillus* (head and body 76). The type of *anna* is 87 head and body, and of *major* 100, and *pictor* 120.

For the status of the Philippines form, not seen, see Tate, p. 632.

There remains to be discussed *Chiropodomys fulvus* of G. M. Allen, which according to Tate differs so widely from *gliroides* that it probably should be excluded from the genus. The differences are pointed out by Tate, p. 630 (hallux with claw, mammae 2—2 = 8, etc.). Tate suggests it is allied to *Mus*; but if the dentition, as I believe is the case, is complex, with the posterointernal present, this can scarcely be the case. And in the original description, G. M. Allen definitely states that the hallux is clawless and opposable, and the first upper molar has three transverse rows with three cusps each, so that the hallux and molars are as in *Chiropodomys* according to the original describer. As it is not represented in London I can offer no remarks on it; but from description it certainly seems to be a *Chiropodomys*, even to the pattern of the lower molars. The mammary formula, 2—2 = 8, suggests *Vandeleuria* or *Micromys*; but this is not a character of importance when dealing with genera.

List of Named Forms

1. CHIROPODOMYS GLIROIDES, Blyth

1855. Journ. Asiat. Soc. Bengal, XXIV, p. 721.
Cherrapunjee, Assam.
Synonym: *penicillatus*, Peters, 1868, Monatsber. K. Akad. Wiss. Berlin, p. 448.
peguensis, Blyth, Journ. Asiat. Soc. Bengal, XXVIII, p. 295, 1859.

2. CHIROPODOMYS NIADIS, Miller

1903. Smiths. Misc. Coll. XLV, p. 40.
Lafau, Nias Island, Sumatra.

3. CHIROPODOMYS ANNA, Thomas & Wroughton

1909. Abstr. Proc. Zool. Soc., London, LXVIII, p. 19, Proc. Zool. Soc. London, 1909, p. 390.
Tjilatjap, Java. Regarded as a subspecies of *gliroides* by Tate.

4. CHIROPODOMYS PICTOR, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 207.
Mt. Kina Balu, N. Borneo.

5. CHIROPODOMYS MAJOR, Thomas

1893. Ann. Mag. Nat. Hist. 6, XI, p. 344.
Sadong, Sarawak, Borneo.

6. CHIROPODOMYS LEGATUS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 206.
Mt. Kina Balu, N. Borneo.

7. CHIROPODOMYS PUSILLUS, Thomas

1893. Ann. Mag. Nat. Hist. 6, XI, p. 345.
Mt. Kina Balu, N. Borneo.

8. CHIROPODOMYS CALAMIANENSIS, Taylor

1934. Philippine Land Mammals, p. 470.
Busanga Island, Calamianes, Philippines.

incertae sedis (see discussion above)

9. CHIROPODOMYS (?) FULVUS, G. M. Allen

1927. Amer. Mus. Nov. 270, p. 11.
Yunnan, S. China, Yinpankai, Mekong River.

Genus 7. VANDELEURIA, Gray

1842. Vandeleuria, Gray, Ann. Mag. Nat. Hist. X, p. 265.

Type Species.—*Mus oleraceus*, Bennett.

Range.—Indian: from Ceylon and southern Peninsular India to Gujerat, Kumaon, Nepal; also Tongking and Siam.

Number of Forms.—Ten.

Characters.—Closely related to *Chiropodomys*, but the feet more specialized, and the skull rather less so. Thus the frontals appear more sharply constricted, and the braincase a little less heavy. Supraorbital ridges usually absent. Rostrum perhaps less shortened. Zygomatic plate straight anteriorly. Palatal foramina rather less shortened usually than in *Chiropodomys*. Upper cheekteeth much as in *Chiropodomys*; the posterointernal cusp well developed; the outer row of M.1 and M.2 well marked; M.3 considerably reduced. Lower teeth less complex than in *Chiropodomys* normally, the outer subsidiary row of cusps not strongly marked.

The size is small, usually or always under 100 head and body. D.5 manus much reduced, the claw suppressed (a nail in its place). D.2 is also reduced, noticeably shorter than the two central digits. D.5 hindfoot also without claw; hallux (apparently) fully opposable, in form like that of *Chiropodomys* and other Rats with this specialization.

Mammae 2—2 = 8. Tail, so far as known, not prehensile; moderately well haired.

Remarks.—The specialized digits distinguish this genus sufficiently both from *Chiropodomys* and from the Palaearctic *Micromys*. Wroughton in his key places the genus in the section in which the posterointernal cusp is absent, which is incorrect.

Forms seen: *dumeticola*, *modesta*, *marica*, *nilagirica*, *nolthenii*, *oleracea*, *rubida*, *spadicea*, *sibylla*, *wroughtoni*.

Wroughton has keyed the species admitted in the Indian Mammal Survey. All appear so closely related that I think it would be quite reasonable to regard them as races of the type species.

List of Named Forms

1. VANDELEURIA RUBIDA, Thomas

1914. Journ. Bombay Nat. Hist. Soc. XXIII, p. 202.
Bageswar, Kumaon, N. India.

2. VANDELEURIA OLERACEA OLERACEA, Bennett

1832. Proc. Zool. Soc. London, p. 121.
India; Dukhun.
Synonym: *dumecolus*, Hodgson, 1841, Journ. Asiat. Soc. Bengal, X, p. 915.
wroughtoni, Ryley, 1914, Journ. Bombay Nat. Hist. Soc. XXII, p. 658. Patal, Surat district.
povensis, Hodgson, 1845, Ann. Mag. Nat. Hist. XV, p. 269.
badius, Blyth, 1859, Journ. Asiat. Soc. Bengal, XXVIII, p. 295.

3. VANDELEURIA OLERACEA SPADICEA, Ryley

1914. Journ. Bombay Nat. Hist. Soc. XXII, p. 659.
Lunwa, Palanpur, Gujerat, W. India.

4. VANDELEURIA OLERACEA MARICA, Thomas

1915. Journ. Bombay Nat. Hist. Soc. XXIV, p. 54.
Chaibassa, Orissa, India.

5. VANDELEURIA OLERACEA MODESTA, Thomas

1914. Journ. Bombay Nat. Hist. Soc. XXIII, p. 202.
Ramnagar, Kumaon, N. India.

6. VANDELEURIA NILAGIRICA NILAGIRICA, Jerdon

1867. Mamm. India, p. 203.
Ootacamund, S. India.

7. VANDELEURIA NILAGIRICA NOLTHENII, Phillips

1929. Ceylon Journ. Sci. Sec. B. XV, p. 165.
West Haputale, Ohiya, Ceylon.

8. VANDELEURIA DUMETICOLA DUMETICOLA, Hodgson

1845. Ann. Mag. Nat. Hist. XV, p. 268.
Nepal.

9. VANDELEURIA DUMETICOLA SCANDENS, Osgood

1932. Field Mus. Publ. Zool. Ser. XVIII, p. 320.
Muong Boum, Tongking.

10. VANDELEURIA SIBYLLA, Thomas

1914. Journ. Bombay Nat. Hist. Soc. XXIII, p. 202.
Chantaboon, Southern Siam.

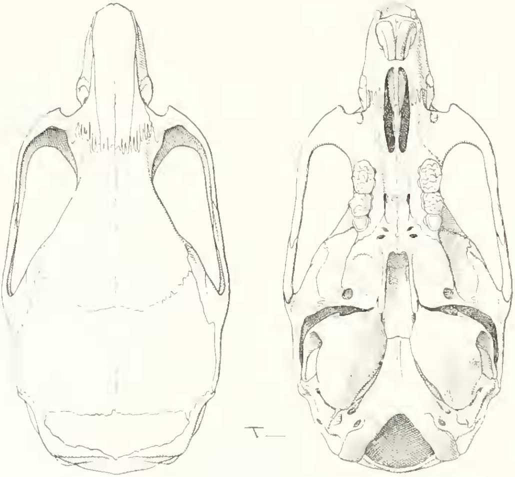

FIG. 4. MICROMYS MINUTUS, Pallas.
B.M. No. 43.3.7.2; × 5.

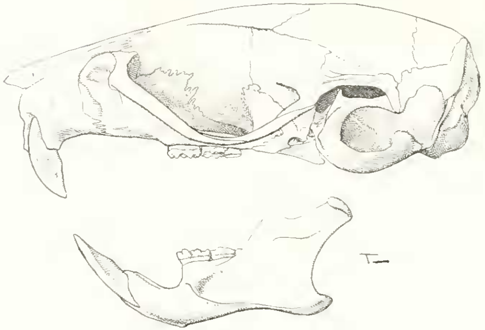

FIG. 5. MICROMYS MINUTUS, Pallas.
B.M. No. 43.3.7.2; × 5.

Genus 8. MICROMYS, Dehne

1841. Micromys, Dehne, *Micromys agilis*, ein neues Säugthier der Fauna von Dresden, p. 1.

Type Species.—*Micromys agilis*, Dehne = *Mus soricinus*, Hermann.

Range.—Principally Palaearctic: Europe, from England and the French side of the Pyrenees, south of the Baltic, east into Finland and European Russia, "northwards approximately to latitude of Leningrad and upper reaches of R. Konda in former Tobolsk subdistrict" (Vinogradov); south in Europe to Italy, and from France, Belgium, Germany, Switzerland, Hungary,

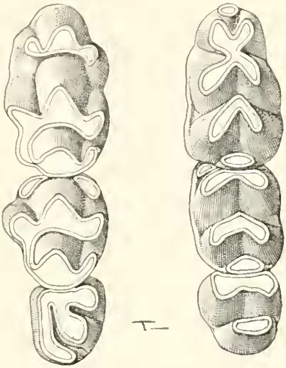

Fig. 6. Micromys minutus.
Cheekteeth : × 13.

Roumania, Serbia. Parts of southern Siberia; and northern Siberia (Yakutsk, Transbaikal district, former Ussuri and Amur districts quoted by Vinogradov). In China known from Moupin, Szechuan, Shensi, Korea, Fukien; and known from Japan. In the Indo-Malayan, occurs in Assam and North Tongking.

Number of Forms.—About seventeen.

Characters.—Size very small. Skull with strongly shortened rostrum, "distance from gnathion to lower edge of infraorbital foramen less than depth through lachrymal region" (Miller); supraorbital ridges not present; braincase large and broad. Zygomatic spread relatively narrow owing to breadth of braincase. Anterior border of zygomatic plate straight.

Incisive foramina long, approaching the toothrows. Palate relatively broad. Bullae large. Upper teeth with a well-developed posterointernal cusp in M.1 and M.2; in M.1 there are nine main cusps present; T.6 is rather enlarged; M.2 with T.1, a small T.3, and all the other cusps present; M.3 of moderate size (though clearly smaller than M.2), with T.1 and two posterior laminae present. T.3 in M.1 may become reduced. T.9 is small in M.1 and M.2; the centre row of cusps is the largest, but neither the inner nor the outer row show much signs of reduction. Lower teeth without special peculiarity, the outer subsidiary cusps small or moderate.

Ear "with triangular valve capable of completely closing the meatus" (Miller). Tail subequal in length to head and body as a rule, rather well haired, prehensile, bare above at tip. Hindfoot with the three central digits relatively long, and also D.5; hallux clawed, and not fully opposable; short. Forefoot with normal digits, "the two posterior palmar tubercles united in median line —and so enlarged that they are confluent along median line behind, forming with the thumb a single tubercular mass opposed to the balls of the fingers" (Miller). D.5 may be shortened to a certain degree. Fur soft.

Mammae 2—2=8. These Mice are so small that they might almost be described as specialized for arboreal life in high grass. Their nest-building habits are well known. The head and body normally is probably always less than 80 mm.

Forms seen: *batarovi*, *erythrotis*, *minutus*, "*minimus*," *japonicus*, *pratensis*, *pygmaeus*, *soricinus*, *ussuricus*.

List of Named Forms

1. MICROMYS MINUTUS MINUTUS, Pallas

1769. Reise Russ. Reichs, 1, p. 454.
Banks of the Volga, Russia.

2. MICROMYS MINUTUS SORICINUS, Hermann

1780. Schreber Säugt. IV, p. 661.
Strassburg, Germany.
Synonym: *meridionalis*, Costa, 1839, Fauna Regno Napoli, p. 13. Vicinity of Naples, Italy.
agilis, Dehne, 1841, *Micromys agilis*, ein neues Säugthier der Fauna von Dresden, p. 1. Dresden, Germany.
messorius, Kerr, 1792, Anim. Kingd., p. 230. Hampshire, England. (For status see Miller, Cat. Mamm. W. Europe, pp. 844, 845, 1912.)
triticeus, Boddaert, 1785, Elenchus Anim. 1, p. 111. Hampshire, England.
minimus, White, 1789, Nat. Hist & Antiq. Selborne, p. 43. Selborne, Hampshire, England.
pendulinus, Hermann, 1804, Observ. Zool. p. 61. Strassburg, Germany.
parvulus, Hermann, 1804, same reference (p. 62) and locality.
campestris, Desmarest, Mammalogie, pt. 2, p. 543. France.
minatus, Schinz, 1840, Europ. Fauna, 1, p. 70.
oryzivorus, de Sélys-Longchamps, Atti della sec. Riunione degli Sci. Ital. Torino, 1840, p. 247. Lombardy, Italy.

(*Micromys minutus soricinus*) *pumilus*, Cuvier, 1842, Hist. Nat. Mamm. p. 4. Paris, France.
campestris, Barrett-Hamilton, 1900, Ann. Mag. Nat. Hist. 7, V, p. 529. Waremme, Liége, Belgium.

3. MICROMYS MINUTUS SUBOBSCURUS, Fritsche
1934. Zeitschr. für Säugetierk. 9, p. 431.
Umgebung von Wesermünde, Germany.

4. MICROMYS MINUTUS PRATENSIS, Ockshay
1831. Nov. Act. Acad. Caes. Nat. Cur. XV, pt. II, p. 243.
Western Hungary.
Synonym: *arundinaceus*, Petenyi, 1882, Termeszetrajzi Fuzetek, V, p. 142.

5. MICROMYS MINUTUS BRAUNERI, Martino
1930. Proc. Zapiski Russ. Sci. Inst. Belgrade, 2, p. 60.
Kraljevo, Serbia, Yugoslavia.

6. MICROMYS MINUTUS MEHELYI, Bolkay
1925. Nov. Mus. Sarajevoensis, 1, p. 12.
Northern part of Balkan Peninsula.

7. MICROMYS MINUTUS FENNIAE, Hilzheimer
1911. Acta Soc. Fauna et Flora Fenn. 34, p. 15.
Mantšala, Finland.

8. MICROMYS MINUTUS SAREPTAE, Hilzheimer
1911. Acta Soc. Fauna et Flora Fenn. 34, p. 18.
Sarepta, Lower Volga.

9. MICROMYS MINUTUS USSURICUS, Barrett-Hamilton
1899. Ann. Mag. Nat. Hist. 7, III, p. 344.
Ussuri, E. Siberia.

10. MICROMYS MINUTUS BATAROVI, Kastschenko
1910. St. Petersbourg Ann. Mus. Zool. Ac. Sci. 15, p. 284.
Transbaikalia, E. Siberia.

11. MICROMYS MINUTUS KYTMANOVI, Kastschenko
1910. St. Petersbourg Ann. Mus. Zool. Ac. Sci. 15, p. 284.
Transbaikalia, E. Siberia.

12. MICROMYS MINUTUS PYGMAEUS, Milne-Edwards
1874. Rech. Mamm. p. 291.
Szechuan, China.

13. MICROMYS MINUTUS BEREZOWSKII, Argyropulo
1929. C.R. Acad. Sci. Leningrad, 1929A, p. 253.
Mountain defile Ho-tzsi-how, vicinity of town Lun-ngan-fu, North Szechuan.

14. MICROMYS MINUTUS JAPONICUS, Thomas
1906. Proc. Zool. Soc. London, 1905, p. 351.
Tosa, Kochi Ken, Shikoku, Japan.

15. MICROMYS MINUTUS AOKII, Kuroda
1922. Journ. Mamm. Baltimore, 3, p. 43.
Tsushima, Japan.

16. MICROMYS MINUTUS HONDONIS, Kuroda

1933. Journ. Mamm. Baltimore, 14, p. 243.
Hondo, Japan.

17. MICROMYS MINUTUS ERYTHROTIS, Blyth

1855. Journ. Asiat. Soc. Bengal, XXIV, p. 721.
Cherrapunji, Assam, India.

Genus 9. APODEMUS, Kaup

1829. APODEMUS, Kaup, Entw. Gesch. und Naturl. Syst. Europ. Thierwelt, 1, p. 154.
1924. SYLVAEMUS, Ognev, Faun. Vert. Gouv. Voronesh, p. 143. (*Mus sylvaticus*, Linnaeus.)
1924. NEMOMYS, Thomas, Journ. Bombay Nat. Hist. Soc. XXIX, p. 889. (*Mus sylvaticus*, Linnaeus.)
1928. ALSOMYS, Dukelski, Zool. Anz. 77, p. 42. (*Mus sylvaticus major*, Radde.)
1935. PETROMYS, Martino, Zap. Russk. 10, p. 85. Subgenus for "*Sylvaemus mystacinus epimelas*," Nehring. (Not of Smith.)

TYPE SPECIES.—*Mus agrarius*, Pallas.

RANGE.—Principally Palaearctic: Europe, from Iceland, Ireland, and Shetland Islands eastwards across Russia; from Scandinavia to the Mediterranean coast, Sicily and Crete; Asia Minor, Turkestan, and across Siberia to the Pacific; Manchuria, Korea, Kansu, Szechuan, Shantung; Sakhalin, Mongolia, and throughout the greater part of China north of the Yangtse; Japan; Kashmir, Punjab; Persia; Syria; Morocco, Algeria. In Indo-Malayan region occurs in Nepal, Burma (specimen in B.M., *speciosus*), Yunnan, Fukien, Riukiu Islands, and Formosa.

NUMBER OF FORMS.—Approximately eighty-five.

REMARKS.—This genus has been divided, as indicated in the synonymy, into three or four genera or subgenera. Ognev erected *Sylvaemus* for the *sylvaticus* group, but gives no list of species to be referred to it or to *Apodemus* s.s. Thomas in the same year erected *Nemomys* for the same group, and listed the species; but his division does not agree with that of Vinogradov's classification; in the former, *speciosus* is referred to "*Nemomys*," but in the latter to *Apodemus* s.s. The genus is best regarded as with no subgenera, but with a number of fairly well-marked specific groups; the characters of these groups intergrade to a certain degree, as I shall endeavour to show. Either each specific group must receive a generic name, which is as unnecessary as it is inconvenient, or all must be referred to *Apodemus*.

CHARACTERS.—Skull with rather broad braincase, and moderate or relatively long rostrum (this not strongly shortened, compare *Micromys*) the nasals usually projecting slightly forwards over incisors. Incisive foramina well open, and reaching the anterior molars as a rule. Palate relatively broad. Bullae medium. Zygoma narrow; zygomatic plate may be straight anteriorly, or nearly so, or slightly cut back, this being a variable character within different races of the same species. In the majority, supraorbital ridges are not developed, but they are present in the *agrarius* group, and in the *speciosus* group. In old specimens of *flavicollis*, the skull tends to become angular, and faintly ridged.

Upper teeth complex, the posterointernal cusp present; the centre row of cusps larger than the outer and inner rows, neither of which are much reduced as a rule. M.1 with T.3 well developed in primitive forms, more reduced, or shortened (i.e., nearer T.2), in *agrarius* group; and with nine cusps present. There are traces often of a small extra posterior cusp on outer side of M.1 in *sylvaticus* group; in *mystacinus* and in *speciosus* sometimes, this cusp is well developed, so that like *Chiropodomys* and others there are four outer cusps in M.1. M.2 with T.3 present, vestigial, or absent; T.1 present; and the three cusps of the second and third laminae all present, though T.9 may become much reduced. In *agrarius*, T.3 is usually suppressed in this tooth. M.3 smaller than M.2, trilaminate as a rule, most reduced in *agrarius* group. In *geisha*, the front lamina of M.1 often appears intermediate to a degree between the *agrarius* and the more normal types.

Lower cheekteeth with the usual Murine elements; the terminal heel of M.1 and M.2 well developed; the outer subsidiary cusps variable in development, sometimes very strong, as in the type of *gurkha*. Mandible without extreme peculiarity; the coronoid may be reduced. In the type of *hirtensis*, the posterointernal cusp is more reduced than is normal for this section.

Fur usually soft, though sometimes, as in *speciosus*, it may become bristly. Forefoot normal. Hindfoot usually noticeably narrow, the three centre digits moderately long, the outer digits not reduced (the toes not shortened, and the foot not broadened for climbing, and hindfoot in a series of specimens of all species always averaging more than 20 per cent head and body length, often 23 per cent or more, compare *Thamnomys* (measurements have been noted of over three hundred specimens in this respect)).

Tail moderately haired, usually subequal to head and body length, or not much longer or shorter. In *agrarius*, a black middorsal stripe is present. M.1 is usually four-rooted. The mammary formula may be 2—2=8 or 1—2=6.

The following characters of some of the main species should indicate that no subgenera may be recognized, though it must be borne in mind that dental characters such as these are apt to be variable to a degree individually.

	SUPRAORBITAL RIDGES	MID-DORSAL STRIPE	MAMMAE	T.3 IN SECOND UPPER MOLAR	T.3 IN M.1	M.3, UPPER
mystacinus	Absent	Absent	1—2=6	Present	Normal	Not reduced
sylvaticus	Absent	Absent	1—2=6	Present	Normal	Not reduced
flavicollis	Braincase ridged in old age	Absent	1—2=6	Present	Normal	Not reduced
speciosus	Present	Absent	2—2=8	Present, or may be vestigial	Normal	Usually not reduced
geisha	Absent	Absent	2—2=8	Often much reduced	In many specimens intermediate between the two types	Not reduced
agrarius	Present	Present	2—2=8	Usually absent	Placed nearer to T.2, or front lamina of M.1 narrowed	More reduced
chevrieri	Present	Absent	(?)	Usually absent	As *agrarius*	More reduced

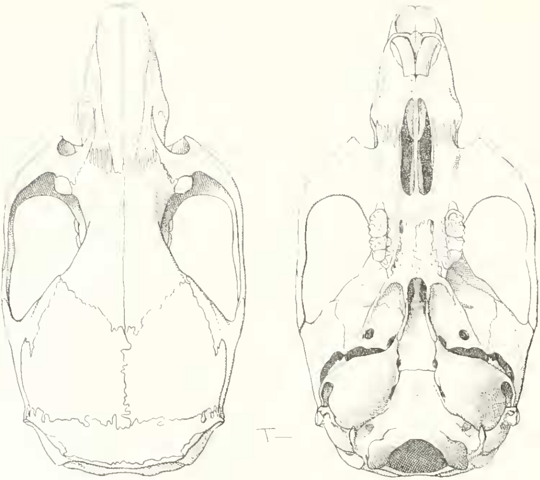

FIG. 7. APODEMUS SYLVATICUS, Linnaeus.
B.M. No. 6.5.1.46, ♂; × 3½.

FIG. 8. APODEMUS SYLVATICUS, Linnaeus.
B.M. No. 6.5.1.46, ♂; × 3½.

Forms seen: *agrarius*, *ainu*, *arianus*, *brauneri*, *butei*, *callipedes*, *celatus*, *ciscaucasicus*, *chevrieri*, *creticus*, *coreae*, *cumbrae*, *dichrurus*, *draco*, *epimelas*, *fergussoni*, *fiolagan*, *flavicollis*, *fridariensis*, *geisha*, *ghia*, *giliacus*, *granti*, *gurkha*, *hamiltoni*, *harti*, *hayi*, *hebridensis*, *hirtensis*, *hokkaidi*, *ilex*, *larus*, *latronum*, *maclean*, *major*, *manchuricus*, *mosquensis*, *mystacinus*, *navigator*, *ningpoensis*, *orestes*, *pallidior*, *peninsulae*, *pentax*, *princeps*, *sagax*, *semotus*, *smyrnensis*, *speciosus*, *sylvaticus*, *tanei*, *thuleo*, *tural*, *tscherga*, *wardi*, *witherbyi*, *wintoni*, *yakui*, *stankovici* (*A. sylvaticus stankovici*, Martino, 1937, from Yugoslavia).

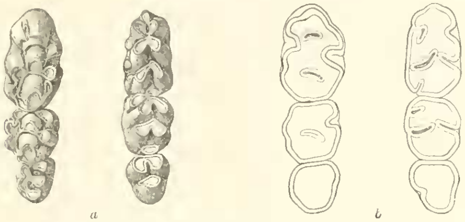

FIG. 9. APODEMUS SYLVATICUS, Linnaeus.
Cheekteeth: *a*, slightly worn; *b*, much worn: × 10.

The following groups are recognized:

agrarius group. Dental characters including simplified front lamina of M.1 and reduced M.3 indicated above; supraorbital ridges present; typically a middorsal stripe present; head and body averaging approximately 95 (up to 118). Mammae 8. With *chevrieri*, similar, but without middorsal stripe.

speciosus group. Dental characters in many specimens seen tending towards the complex type found in *mystacinus*, though there is some variation individually. Supraorbital ridges present.

With (?) *gurkha*, from Nepal (Thomas suggested that it was nearest *speciosus*; lower molars typically complex, with strong outer subsidiary row).

Head and body averaging about 108 (97–133), in *speciosus*; *gurkha* is smaller (about 91 average).

Mammae usually 8, but 1—2=6 in *semotus* from Formosa.

sylvaticus group. Dental characters without extreme peculiarity, i.e., M.3 not tending to be reduced, outer row of first upper molar usually less complex than *mystacinus*, and its front lamina not compressed as in *agrarius*. No supraorbital ridges, or these faint (old *flavicollis*). Mammae 6, head and body averaging about 95 (81–112), in eighty-three specimens from Europe, Asia, and Africa; with *hebridensis*, *hirtensis* (posterointernal cusp evidently tending to be reduced), *fridariensis* (the last-named three forms rather larger, averaging slightly over 100), and *flavicollis* (head and body averaging about 105 (up to 130 according to Vinogradov), and skull more angular in adult than is usual for the group.

geisha group. Near the last, but averaging smaller (about 80 head and body (70–90)); tail in all measurements noted rather longer than head and body; mammae 8; a group confined to Japan, and nearly allied to *sylvaticus* group.

mystacinus group. Normally with more complex teeth than in *sylvaticus* group (usually four outer cusps in M.1, etc.); at extreme development largest of genus (head and body averaging roughly 120 (100–150)), and hindfoot relatively shorter than in *sylvaticus* group, in this character agreeing with *agrarius*. No supraorbital ridges. Mammae 6.

List of Named Forms

mystacinus Group

1. APODEMUS MYSTACINUS MYSTACINUS, Danford & Alston

1877. Proc. Zool. Soc. London, p. 279.
Zebil, Bulgar Dagh, Asia Minor.

2. APODEMUS MYSTACINUS SMYRNENSIS, Thomas

1903. Ann. Mag. Nat. Hist. 7, XII, p. 188.
Smyrna, Asia Minor.

3. APODEMUS MYSTACINUS EUXINUS, G. M. Allen

1915. Bull. Mus. Comp. Zool. Harvard Coll. LIX, p. 11.
Scalita, Asia Minor.

4. APODEMUS MYSTACINUS RHODIUS, Festa

1914. Boll. Mus. Zool. Anat. Comp. Torino, 29, p. 10.
Aghios Isidoros, Rhodes.

5. APODEMUS EPIMELAS, Nehring

1902. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 2.
Agoriana, Parnassus, Greece.

sylvaticus Group

6. APODEMUS SYLVATICUS SYLVATICUS, Linnaeus

1758. Syst. Nat. 1, 10th ed., p. 62.
Upsala, Sweden.
Synonym: *sylvaticus celticus*, Barrett-Hamilton, 1900, Proc. Zool. Soc. p. 401. Ireland.
parvus, Bechstein, 1793, Getreue Abbild. Naturhist. Gegenstände, 1, p. 100. Thüringen, Germany.
candidus, Bechstein, same reference, p. 101.
varius, Bechstein, same reference, p. 101.
niger, Bechstein, same reference.

(*Apodemus sylvaticus sylvaticus*) *albus*, Bechstein, 1801, Gemeinn. Naturgesch. Deutschlands, 1, 2, p. 965. Thüringen, Germany.
leucocephalus, Bechstein, same reference, p. 966.
intermedius, Bellamy, 1839, Nat. Hist. of South Devon, p. 330. Devonshire, England.

7. APODEMUS SYLVATICUS BUTEI, Hinton

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 123.
Bute, Hebrides.

8. APODEMUS SYLVATICUS CALLIPIDES, Cabrera

1907. Bol. Real. Soc. Esp. Hist. Nat. Madrid, VII, p. 228.
Villarutis, la Coruña, Spain.

9. APODEMUS SYLVATICUS DICHRURUS, Rafinesque

1814. Précis des Découvertes Somiologiques, p. 13.
Sicily.
Synonym: *pecchioli*, Pecchioli, 1844, Atti della quinta Unione degli Sci. Ital. Torino, 1843, p. 426. Tuscany, probably vicinity of Siena, Italy.

10. APODEMUS SYLVATICUS CRETICUS, Miller

1910. Ann. Mag. Nat. Hist. 8, VI, p. 460.
Katharo, Crete.

11. APODEMUS SYLVATICUS FLAVOBRUNNEUS, Hilzheimer

1912. Acta Soc. Fauna et Flora Fenn. 34, 1911, p. 7.
N. Germany.

12. APODEMUS SYLVATICUS DISCOLOR, Noack

1918. Z. Forst. u. Jagdwesen Berlin, 50, p. 466.
Eberswalde, near Berlin, Germany.

13. APODEMUS SYLVATICUS SPADIX, Fritsche

1934. Zeitschr. für Säugetierk. 9, p. 435.
Weidhausen bei Sonneberg, Thuringia, Germany.

14. APODEMUS SYLVATICUS ISLANDICUS, Theinemann

1827. Reise im Nord. Europ. II, p. 153.
Iceland.

15. APODEMUS SYLVATICUS FENNICUS, Hilzheimer

1912. Acta Soc. Fauna et Flora Fenn. 34, 1911, p. 9.
Kirchspiel Saaksmaki (nordl. v. Tavastehus), Finland.

16. APODEMUS SYLVATICUS BERGENSIS, Krausse

1921. Arch. Naturg. Berlin, 87, 6, p. 41.
Bergen, Norway.

17. APODEMUS SYLVATICUS BAESSLERI, Dahl

1931. Bull. Soc. Nat. Crimée, 11, p. 159.
Crimea, S. Russia.

18. APODEMUS SYLVATICUS CISCAUCASICUS, Ognev

1924. Rodentia of N. Caucasus, Rostov-on-Don, p. 48.
N. Caucasus, Russia.

19. APODEMUS SYLVATICUS FULVIPECTUS, Ognev

1924. Rodentia of N. Caucasus, Rostov-on-Don, p. 47.
N. Caucasus, Russia.

20. APODEMUS SYLVATICUS MOSQUENSIS, Ognev

1913. Fauna Mosquensis, Bpl. 1, Teil 1, p. 204.
Gouv. Moskow, Smolensk, Russia.

21. APODEMUS SYLVATICUS TSCHERGA, Kastschenko

1899. Res. Zool. Exp. to Altai, 1898, p. 46.
Cherga Village, Altai, Siberia.

22. APODEMUS SYLVATICUS BALCHASCHENSIS, Kashkarov

1922. Trudy Sredne-Asiatskago Gosudarstv. Universitet.
No type locality. (Shores Lake Balkash, according to Vinogradov.)

23. APODEMUS SYLVATICUS TOKMAK, Severtzow

1873. Isvestia Obshchestva lubitelei estestvodnania, vol. XXVII, 3, Moscow.
Semirechie district, N. Turkestan; Aleksandror mountain ridge.

24. APODEMUS SYLVATICUS MAJUSCULUS, Turov

1924. C. R. Acad. Sci. Leningrad, p. 110.
Lake Baikal, Siberia.

25. APODEMUS SYLVATICUS MICROTIS, Miller

1912. Proc. Biol. Soc. Washington, XXV, p. 60.
Vicinity of Dzharkent, Russian Turkestan.

25a. APODEMUS SYLVATICUS PALLIDUS, Kaschkaroff

1926. Key to Rodents of Turkestan, p. 22.
Usbekistan Exp. Plant. Prot. Station, Tashkent, Mountains of Turkestan.

26. APODEMUS SYLVATICUS PALLIPES, Barrett-Hamilton

1900. Proc. Zool. Soc. London, p. 417.
Surhad Wahkan, Turkestan (probably Chinese Turkestan).

27. APODEMUS SYLVATICUS CHORASSANICUS, Ognev & Heptner

1928. Zool. Anz. 75, p. 263.
Makhtum-Kala, Askabad, Kopet-Dag, Turkestan.

28. APODEMUS SYLVATICUS TAURICUS, Barrett-Hamilton

1900. Proc. Zool. Soc. London, p. 412.
Zebil, Bulgar Dagh, Asia Minor.

29. APODEMUS SYLVATICUS ARIANUS, Blanford

1881. Ann. Mag. Nat. Hist. 5, VII, p. 162.
Kohrud, N. Persia.

30. APODEMUS SYLVATICUS ERYTHRONOTUS, Blanford

1875. Ann. Mag. Nat. Hist. 4, XVI, p. 311.
Kohrud, Persia.

31. APODEMUS SYLVATICUS WITHERBYI, Thomas

1902. Ann. Mag. Nat. Hist. 7, X, p. 490.
Sheoul, Fars, Persia.

32. APODEMUS SYLVATICUS WARDI, Wroughton

1908. Journ. Bombay Nat. Hist. Soc. XVIII, p. 282.
Saspul, Ladak.

33. APODEMUS SYLVATICUS PENTAX, Wroughton

1908. Journ. Bombay Nat. Hist. Soc. XVIII, p. 283.
Thandiana, Punjab, N. India.

34. APODEMUS SYLVATICUS HAYI, Waterhouse

1837. Proc. Zool. Soc. London, p. 76.
Morocco.

35. APODEMUS HEBRIDENSIS HEBRIDENSIS, de Winton

1895. Zoologist, 3rd ser. XIX, p. 369.
Lewis, Outer Hebrides.

36. APODEMUS HEBRIDENSIS HAMILTONI, Hinton

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 126.
Rum, Inner Hebrides.

37. APODEMUS HEBRIDENSIS TIRAE, Montagu

1923. Proc. Zool. Soc. London, 1922, p. 934.
Tiree, Inner Hebrides.

38. APODEMUS HEBRIDENSIS GHIA, Montagu

1923. Proc. Zool. Soc. London, 1922, p. 935.
Gigha, Inner Hebrides.

39. APODEMUS HEBRIDENSIS TURAL, Montagu

1923. Proc. Zool. Soc. London, 1922, p. 935.
Islay, Inner Hebrides.

40. APODEMUS HEBRIDENSIS LARUS, Montagu

1923. Proc. Zool. Soc. London, 1922, p. 936.
Jura, Inner Hebrides.

41. APODEMUS HEBRIDENSIS CUMBRAE, Hinton

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 128.
Great Cumbrae Island, Inner Hebrides.

42. APODEMUS HEBRIDENSIS MACLEAN, Hinton

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 129.
Mull, Inner Hebrides.

43. APODEMUS HEBRIDENSIS FIOLAGAN, Hinton

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 131.
Arran Island, Inner Hebrides.

44. APODEMUS HIRTENSIS, Barrett-Hamilton

1899. Proc. Zool. Soc. London, p. 81.
St. Kilda, Outer Hebrides.

45. APODEMUS FRIDARIENSIS FRIDARIENSIS, Kinnear

1906. Ann. Scottish Nat. Hist. XV, p. 48.
Fair Isle, Shetlands.

46. APODEMUS FRIDARIENSIS GRANTI, Hinton

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 132.
Mid Yell, Shetlands.

47. APODEMUS FRIDARIENSIS THULEO, Hinton

1919. Scot. Nat. p. 178.
Foula, Shetlands.

48. APODEMUS FLAVICOLLIS FLAVICOLLIS, Melchior

1834. Danske Staats og Norges Pattedyr, p. 99.
Sielland, Denmark.
Synonym: *sylvaticus princeps*, Barrett-Hamilton, 1900, Proc. Zool. Soc. London, p. 408. Rumania.

(*Apodemus flavicollis flavicollis*) *cellarius*, Fischer, 1866, Zool. Gart. VII, p. 153. Near Luga, Russia.
typicus, Hamilton, 1900, Proc. Zool. Soc. London, p. 404.

49. APODEMUS FLAVICOLLIS WINTONI, Barrett-Hamilton
1900. Proc. Zool. Soc. London, p. 406.
Graftonbury, Herefordshire, England.

50. APODEMUS FLAVICOLLIS BRAUNERI, Martino
1927. Ann. Mus. Budapest, 23, p. 166.
Topcider, near Belgrade, Serbia.

51. APODEMUS FLAVICOLLIS SAMARIENSIS, Ognev
1923. Biol. Mitt. Timiriazeff, 1, p. 107.
Samara, S.-E. Russia.
Synonym: *samaricus*, Ognev, 1923, Fauna Voronesh, p. 144.

52. APODEMUS FLAVICOLLIS PONTICUS, Sviridenko
1936. Abs. Works Zool. Inst. Moscow State Univ. 3, p. 103.
Olgino Village, Chernomorski district (Black Sea), Russia.

53. APODEMUS FLAVICOLLIS RUSIGES, Miller
1913. Proc. Biol. Soc. Washington, XXVI, p. 81.
Central Kashmir.
Synonym: *griseus*, True, 1894, Proc. U.S. Nat. Mus. XVII, p. 8, name preoccupied.

54. APODEMUS FLAVICOLLIS POHLEI, Aharoni
1933. Zeitschr. für Säugetierk. 7, p. 183.
Syria, Kafrun im Nussarijeh Mountain, north-east of Lebanon.

55. APODEMUS ILEX, Thomas
1922. Ann. Mag. Nat. Hist. 9, X, p. 404.
Salween-Mekong Divide, Yunnan, China.

geisha Group

56. APODEMUS GEISHA GEISHA, Thomas
1905. Ann. Mag. Nat. Hist. 7, XV, p. 491.
Hondo, Japan.

57. APODEMUS GEISHA YAKUI, Thomas
1906. Proc. Zool. Soc. London, 1905, p. 362.
Mountains of Central Yakushima, south of Japan.

58. APODEMUS GEISHA CELATUS, Thomas
1906. Proc. Zool. Soc. London, 1905, 2, p. 359.
Oki Islands (Dogo Islands), Japan.

59. APODEMUS GEISHA HOKKAIDI, Thomas
1906. Proc. Zool. Soc. London, 1905, 2, p. 350.
Noboribetsu, Hokkaido, Japan.

60. APODEMUS GEISHA TANEI, Kuroda
1924. New Mammals from Riukiu Islands, p. 9, Tokyo.
Riukiu Islands, Nishino-omote, Tanegashima.

60a. APODEMUS GEISHA SAGAX, Thomas
1908. Proc. Zool. Soc. London, p. 54.
Izuhara, South Island of Tsushima, Japan.

speciosus Group

61. APODEMUS SPECIOSUS SPECIOSUS, Temminck

1845. Fauna Japonica, p. 52.
Japan.
Synonym: *argenteus*, Temminck, 1845, Fauna Japonica, p. 51. Japan.

62. APODEMUS SPECIOSUS AINU, Thomas

1906. Proc. Zool. Soc. London, 1905, 2, p. 349.
Aoyama, Hokkaido, Japan.

63. APODEMUS SPECIOSUS NAVIGATOR, Thomas

1906. Proc. Zool. Soc. London, 1905, 2, p. 358.
Oki Islands, Japan.

64. APODEMUS SPECIOSUS PENINSULAE, Thomas

1906. Proc. Zool. Soc. London, p. 862.
Min-gyong, 110 miles S.E. of Seoul, Korea.

65. APODEMUS SPECIOSUS GILIACUS, Thomas

1907. Proc. Zool. Soc. London, p. 411.
Darine, Saghalien.

66. APODEMUS SPECIOSUS DORSALIS, Kuroda

1924. New Mammals from Riukiu Islands, p. 9, Tokyo.
Riukiu Islands, Miyanoura, Yakushima.

67. APODEMUS SPECIOSUS RUFULUS, Dukelski

1928. Zool. Anz. 77, p. 44.
75 versts south-west of Vladivostok, Ussuri, E. Siberia.

68. APODEMUS SPECIOSUS MAJOR, Radde

1862. Reise Sib. I, p. 180.
Bureja Mountains, Province of Amur, E. Siberia.

69. APODEMUS SPECIOSUS NIGRITALUS, Hollister

1913. Smiths. Misc. Coll. 60, XXIV, p. 1.
Tapucha, Altai Mountains, Siberia.

70. APODEMUS SPECIOSUS ORESTES, Thomas

1911. Abstr. Proc. Zool. Soc. London, p. 49. Proc. Zool. Soc. London, 1912, p. 136.
Mount Omi, W. Szechuan, China.

71. APODEMUS SPECIOSUS LATRONUM, Thomas

1911. Abstr. Proc. Zool. Soc. London, p. 49. Proc. Zool. Soc. London, 1912, p. 137.
Ta-tsien-lu, W. Szechuan.

72. APODEMUS SPECIOSUS PRAETOR, Miller

1914. Proc. Biol. Soc. Washington, XXVII, p. 89.
On Sungaree River, 60 miles south-west of Kirin, Kirin Province, Manchuria.

73. APODEMUS DRACO, Barrett-Hamilton

1900. Proc. Zool. Soc. London, p. 418.
Kuatun, N.W. Fo-kien, S. China.

74. APODEMUS SEMOTUS, Thomas

1908. Ann. Mag. Nat. Hist. 8, I, p. 447.
Formosa.

75. APODEMUS GURKHA, Thomas

1924. Journ. Bombay Nat. Hist. Soc. XXIX, p. 888.
Laprak, Gorkha, Nepal.

agrarius Group

76. APODEMUS CHEVRIERI CHEVRIERI, Milne-Edwards

1868. Rech. Mamm. p. 288.
Moupin, Szechuan, China.

77. APODEMUS CHEVRIERI FERGUSSONI, Thomas

1911. Abstr. Proc. Zool. Soc. London, p. 4. Proc. Zool. Soc. London, p. 172.
Wen-hsien, S. Kansu, China.

78. APODEMUS AGRARIUS AGRARIUS, Pallas

1778. Nov. Sp. Quad. Glir. Ord. p. 95.
Berlin, Germany.
Synonym: *rubens*, Oken, Lehrb. d. Natur. III, pt. 11, p. 898, 1816. N. Germany.
pratensis, Ockskay, Nov. Acta. Leop. 1831, XV, 2, p. 243. East parts of Hungary.
maculatus, Bechstein, 1801, Gemeinn. Naturgesch. Deutschlands, 1, 2, p. 975. Thüringen, Germany.
albostriatus, Bechstein, same reference.

79. APODEMUS AGRARIUS NIKOLSKII, Migouline

1927. Trav. Soc. Nat. Charkov, 50, no. 2, p. 41.
Ukraine, S. Russia.

80. APODEMUS AGRARIUS SEPTENTRIONALIS, Ognev

1924. Rodentia of North Caucasus, Rostov-on-Don, p. 45.
Dmitrovsk, sub-district Uesd of the Moscow Govt.

81. APODEMUS AGRARIUS OGNEVI, Johansen

1923. Trans. Tomsk Univ. vol. 72, p. 59.
Novo-Kuskov, W. Siberia.

82. APODEMUS AGRARIUS MANTCHURICUS, Thomas

1898. Proc. Soc. Zool. London, p. 774, footnote.
Manchuria.

83. APODEMUS AGRARIUS COREAE, Thomas

1908. Proc. Zool. Soc. London, p. 8.
Min-gyong, 110 miles south-east of Seoul, Korea.

84. APODEMUS AGRARIUS PALLIDIOR, Thomas

1908. Proc. Zool. Soc. London, p. 8.
Shantung Peninsula, E. China.

85. APODEMUS AGRARIUS NINGPOENSIS, Swinhoe

1870. Proc. Zool. Soc. London, p. 637.
Ningpo, S. China.
Synonym: *harti*, Thomas, 1898, Proc. Zool. Soc. London, p. 774. Kuatun, Fukien, South China.

Vinogradov (Rodents of U.S.S.R.) quoted a form *A. sylvaticus uralensis*, Pallas, from Southern Ural. The reference to this has not been traced.

Genus 10. THAMNOMYS, Thomas

1907. THAMNOMYS, Thomas, Ann. Mag. Nat. Hist. 7, XIX, p. 121.

TYPE SPECIES.—*Thamnomys venustus*, Thomas.

RANGE.—African: chiefly Cameroons and Congo, extending east to Ruwenzori, west to Gold Coast.

NUMBER OF FORMS.—Seven.

CHARACTERS.—Skull with relatively long rostrum, and usually broad braincase; supraorbital ridges powerful, except in *kuru*. Incisive foramina very well open, approaching toothrows, particularly long in the *venustus* group. Bullae medium. Zygomatic plate more or less straight anteriorly. Infraorbital foramen relatively large, not much narrowed below. Two very distinct types of dentition occur. In *venustus* and *kempi* the teeth are very much as in *Oenomys*, which according to Tullberg shows modification towards vegetarian diet; but a well-developed posterointernal cusp is present in M.1 and M.2. M.1 has nine cusps (and a small extra posteroexternal one); M.2 has a small T.3, also T.1, and all other cusps present except T.2. M.3 has three well-marked inner cusps, and two centre cusps apparently; just as in *Oenomys*, the tooth is distorted, so that most traces of the outer row are suppressed.

T. rutilans and *kuru* have not such an extreme dentition; the rows of cusps appear to be less raised up, and the valleys separating them are less deep. M.3 is trilaminate, relatively large, and complex; the outer row is less vestigial than in the *venustus* group. The lower teeth have the usual elements, in this genus; the type species has the pattern like that of *Oenomys*; supplementary cusps are well developed, and the general effect is complex; the terminal heel of M.1 and M.2 well developed. M.1 5-rooted.

The hindfoot is shortened and broadened for arboreal life; D.5 is nearly as long as D.2. Toes short; hallux relatively long, clawed, probably not opposable. Tail longer than head and body, relatively well haired, tufted faintly at end. Mammae of type species, 0—2 = 4.

T. kempi is perhaps not more than a race of *venustus*; the molars are larger, and the size rather larger. *T. kuru* differs apparently from *rutilans* in the shape of the skull.

Measurements of types:

kuru: head and body, 145; tail, 200; hindfoot, 35.
rutilans centralis: head and body, 135; tail, 180; hindfoot, 24.
venustus: head and body, 125; tail, 181; hindfoot, 25.
kempi: head and body, 141; tail, 189; hindfoot, 27·5.

Average and extremes of fifteen specimens of *rutilans*: head and body, 137·6 179·8 (162–200); hindfoot, 24·4 (23–25).

The hindfoot averages 18·1 per cent of head and body length in thirty-three specimens available (including all species).

Forms seen: *centralis*, *kempi*, *kuru*, *rutilans*, *venustus*.

List of Named Forms

rutilans Group

1. THAMNOMYS KURU, Thomas & Wroughton

1907. Ann. Mag. Nat. Hist. 7, XIX, p. 381.
Angu, Welle River, Congo.

2. THAMNOMYS RUTILANS RUTILANS, Peters

1876. Monatsber. k. Akad. Wiss. Berlin, p. 478.
Limbareni, Cameroons.

3. THAMNOMYS RUTILANS CENTRALIS, Dollman

1914. Extr. Rev. Zool. Afr. IV, fasc. 1, p. 83.
Mambaka, Fundi, Pilipili, Upper Congo.

venustus Group

4. THAMNOMYS VENUSTUS VENUSTUS, Thomas

1907. Ann. Mag. Nat. Hist. 7, XIX, p. 122.
Uganda, E. Ruwenzori.

5. THAMNOMYS VENUSTUS SCHOUTEDENI, Hatt

1934. Amer. Mus. Nov. 708, p. 9.
Medje, Ituri, Belgian Congo.

6. THAMNOMYS KEMPI KEMPI, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 658.
Buhamba, near Lake Kivu, Belgian Congo.

7. THAMNOMYS KEMPI MAJOR, Hatt

1934. Amer. Mus. Nov. 708, p. 10.
Lukumi, North slope Mt. Karisimbi, Kivu volcanoes, Congo.

Genus 11. GRAMMOMYS, Thomas

1915. Grammomys, Thomas, Ann. Mag. Nat. Hist. 8, XVI, p. 150.

Type Species.—*Mus dolichurus*, Smuts.

Range.—African: Sudan, Kenya, Uganda. Timbuktu. Liberia; Congo; Nyasaland, Mozambique, Transvaal, and South Africa. Angola.

Number of Forms.—Twenty-three.

Characters.—The posterointernal cusp becoming much reduced, sometimes barely traceable, never large and inwardly projecting (compare *Thamnomys*), reduced to a low connecting ridge between T.4 and T.8. Skull with broad braincase. Supraorbital ridges relatively weak or can be absent; bullae variable, often rather small; other essential cranial characters as in *Thamnomys*. Jugal relatively long.

Pattern of cheekteeth: T.9 strong in M.1, as are all other cusps except T.7, which is vestigial. M.2 with the centre cusps large; T.3 vestigial; T.7 very small. M.3 with a moderate T.3, the three cusps on the second lamina, and a small posterior portion. The centre row of cusps is strongly enlarged in this genus. M.1 five-rooted. Lower teeth rather less complex as a rule than in *Thamnomys*, but the subsidiary outer cusps as a rule quite well developed.

External characters near *Thamnomys*, but feet as a rule less obviously specialized for arboreal life than in either *Thamnomys* or *Thallomys*. Mammae 0—2 = 4 or 1—2 = 6 (Thomas). The tail is much longer than the head and body, often half as long again. The hindfoot percentage of head and body averages 20·4 in forty-one specimens (including all species represented), which is longer than the percentage in *Thamnomys*.

Forms seen: *aridulus*, *baliolus*, *buntingi*, *cometes*, *dolichurus*, *discolor*, *dryas*, *elgonis*, *gazellae*, *gigas*, *ibeanus*, *insignis*, *lutosus*, *macmillani*, *ruddi*, *surdaster*, *tuareg*, *usambarae*.

All forms seem very closely allied to each other, so that several of the forms now standing as species could probably be reduced to subspecific rank. *G. ruddi* is a distinct species based on a skull which has the teeth so worn that there is some doubt as to its generic position on this character alone, but it differs also from the others in its (for the genus) unusually large bullae; other specimens may be seen to have a vestigial posterointernal cusp, though it seems that this cusp is in this species about to become suppressed. In the characters of the bullae *G. ruddi* makes an approach towards *Thallomys*.

REMARKS.—Hollister, 1919, remarked that the characters proposed by Thomas for this genus were too vague even for subgeneric recognition, and synonymized it with *Thamnomys*, from which it was split. But there is an unquestionable difference in the dentitions of the two genera, particularly the development of T.7; and also apparently in the feet. Taking this into account, and also the great distinctness dentally between the two groups of species referred to *Thamnomys*, I would not feel justified in reducing this genus to a subgenus. In old age, for instance, the posterointernal may in this genus become almost untraceable, which is not the case in other genera with this cusp, until the entire pattern wears right out, so far as I have seen.

Like several other arboreal Muridae (including Cricetines as *Nyctomys*), these Rats carry their young attached to the nipples, or so I am told.

List of Named Forms

dolichurus Section

1. GRAMMOMYS MACMILLANI MACMILLANI, Wroughton

1907. Ann. Mag. Nat. Hist. 7, XX, p. 504.
Wouida, north of Lake Rudolf, Abyssinia.

2. GRAMMOMYS MACMILLANI ARIDULUS, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 268.
Wadi Aribo, Darfur, Sudan.

3. GRAMMOMYS MACMILLANI GAZELLAE, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 282.
Chak-Chak, Bahr-el-Ghazal, Sudan.

4. GRAMMOMYS MACMILLANI OBLITUS, Osgood
1910. Field Mus. Nat. Hist. Publ. Zool. ser. X, 3, p. 16.
Voi, Kenya.

5. GRAMMOMYS MACMILLANI TUAREG, Braestrup
1935. Vidensk. Medd. Dansk. Nat. Foren. Bd. 99, p. 113.
Timbuktu, French W. Africa.

6. GRAMMOMYS MACMILLANI OCHRACEUS, G. M. Allen
1912. Bull. Mus. Comp. Zool. Harvard Coll. LIV, p. 422.
Meru River, north of Mount Kenya.

7. GRAMMOMYS IBEANUS IBEANUS, Osgood
1910. Field Mus. Nat. Hist. Zool. X, 2, p. 8.
Molo, Kenya.

8. GRAMMOMYS IBEANUS LUTOSUS, Dollman
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 657.
Mount Nyiro, Kenya.

9. GRAMMOMYS SURDASTER SURDASTER, Thomas & Wroughton
1908. Proc. Zool. Soc. London, p. 550.
Zomba, Nyasaland.
Synonym: *usambarae*, Matschie, 1915, Sitz. Ber. Ges. Nat. Fr. Berlin, p. 99. Amani, Tanganyika.

10. GRAMOMMMYS SURDASTER INSIGNIS, Dollman
1911. Ann. Mag. Nat. Hist. 8, VII, p. 528.
Mt. Elgon, Kenya.

11. GRAMMOMYS SURDASTER POLIONOPS, Osgood
1910. Field Mus. Nat. Hist. Publ. Zool. ser. X, 2, p. 8.
Lukenya Hills, Kenya.

12. GRAMMOMYS SURDASTER LITTORALIS, Heller
1912. Smiths. Misc. Coll. LIX, p. 10.
Mazeras, Kenya.

13. GRAMMOMYS SURDASTER ELGONIS, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 282.
Malakisi, Mount Elgon.

14. GRAMMOMYS SURDASTER CALLITHRIX, Hatt
1934. Amer. Mus. Nov. 708, p. 11.
Garamba, Upper Uelle, Congo.

15. GRAMMOMYS SURDASTER DISCOLOR, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 283.
Kakumega Forest, Kenya.

16. GRAMMOMYS DRYAS, Thomas
1907. Ann. Mag. Nat. Hist. 7, XIX, p. 123.
E. Ruwenzori, Uganda.

17. GRAMMOMYS BUNTINGI, Thomas
1911. Ann. Mag. Nat. Hist. 8, VII, p. 381.
Bassa, Liberia.

18. GRAMMOMYS COMETES, Thomas & Wroughton

1908. Proc. Zool. Soc. London, p. 549.
Inhambane, Portuguese E. Africa.

19. GRAMMOMYS DOLICHURUS DOLICHURUS, Smuts

1832. Enum. Mamm. Cap. p. 38, pl. ii.
Cape Town district.

20. GRAMMOMYS DOLICHURUS TONGENSIS, Roberts

1931. Ann. Transv. Mus. 14, p. 234.
Manaba, N. Zululand.

21. GRAMMOMYS BALIOLUS, Osgood

1910. Ann. Mag. Nat. Hist. 8, V, p. 278.
Woodbush Hills, north-east of Pietersburg, Transvaal.

22. GRAMMOMYS GIGAS, Dollman

1911. Ann. Mag. Nat. Hist. 8, VII, p. 527.
Solai, Mt. Kenya.

ruddi Section

23. GRAMMOMYS RUDDI, Thomas & Wroughton

1908. Proc. Zool. Soc. London, p. 549.
Tette, Mozambique.

Genus 12. CARPOMYS, Thomas

1895. Carpomys, Thomas, Ann. Mag. Nat. Hist. 6, XVI, p. 161.

Type Species.—*Carpomys melanurus*, Thomas.

Range.—Luzon, Philippine Islands.

Number of Forms.—Two.

Characters.—Zygomatic plate and infraorbital foramen with the same elements as *Batomys* (next to be described). Frontals much constricted; supraorbital ridges feeble or absent; braincase round and heavy. Rostrum shorter than in *Batomys*. Bullae of moderate size, appearing rather flat. Palate broad, not extending back to posterior part of toothrow. Incisors thick in the type species, less so in *phaeurus*, in which species the toothrow is reduced, and the teeth much less heavy than in the type. Upper teeth abnormal; posterointernal cusp present in M.1 and M.2; in all skulls seen the cusps obsolete, and the pattern more or less laminate; M.1 appears to have a front lamina with three cusps, a second lamina with the same elements, a third lamina with T.7 and then divided into two by a deep re-entrant fold from the outer side, so that in all there are four laminae. M.2 with the same elements except that the front lamina is represented by T.1 only. M.3 with T.1, the second lamina, and a posterior lamina doubled as in the other molars in some skulls; in others it appears to consist of T.1 followed by two transverse plates. In the lower molars, the terminal heel of M.1 and M.2 is large; M.1 with foremost lamina with outer fold present, this lamina consequently doubled. This peculiar doubling of the laminae seems to be quite without parallel in the subfamily, though it may represent in the upper molars an extreme development of the elements corresponding to the fourth (posteroexternal) cusp often met with in complex-toothed genera.

Mammae 0—2=4. Hindfoot broad, of arboreal type, but hallux clawed and not opposable. D.5 lengthened. Fur thick; form rather heavy; tail well haired, almost completely so in the type species. Size moderate (roughly 200 mm. head and body).

Forms seen: *melanurus*, *phaeurus*.

The differences between these species in dental characters are indicated above. Thomas gives measurement of 36 mm. basal length and 6·1 toothrow for *phaeurus*; and 39·3 basal length, 8·8 upper molars for *melanurus*.

List of Named Forms

melanurus Group

1. CARPOMYS MELANURUS, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 162.
Monte Data, N. Luzon, Philippine Islands.

phaeurus Group

2. CARPOMYS PHAEURUS, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 162.
Monte Data, N. Luzon, Philippine Islands.

Genus 13. BATOMYS, Thomas

1895. Batomys, Thomas, Ann. Mag. Nat. Hist. 6, XVI, p. 162.

Type Species.—*Batomys granti*, Thomas.

Range.—Luzon, Philippine Islands.

Number of Forms.—Two.

Characters.—Skull with considerable interorbital constriction, and broad short braincase; rostrum lengthened to a degree; supraorbital ridges present. Infraorbital foramen extremely narrowed both above and below; zygomatic plate straight anteriorly, broad, slanting sharply upwards, so that its upper border is nearly on level with maxillary root of zygoma instead of (as usual) considerably below it, the general effect much like that of a Microtine. Bullae relatively small. Palate broad, extending only to M.2 in those seen. Incisive foramina broad, of moderate length, tending to be narrowed anteriorly. Cheekteeth rather hypsodont, not essentially different from a simplified *Rattus* type, but M.1 and M.2 with a well-developed posterointernal cusp; M.3 moderate in size. The cusps not well marked, wearing right down in age so that the pattern becomes laminate, but in those seen it is not obliterated. Lower molars M.1 and M.2 with a relatively very large terminal heel, which in one skull appears almost as an extra lamina; otherwise the lower teeth are without peculiarities. Incisors thin.

Essential external characters as in *Carpomys*.
Forms seen: *granti*.

List of Named Forms

1. BATOMYS GRANTI, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 162.
Luzon, Philippine Islands.

2. BATOMYS DENTATUS, Miller

1911. Proc. U.S. Nat. Mus. XXXVIII, p. 400.
Benguet, Luzon, Philippine Islands.

Genus 14. PITHECHEIR, Cuvier

1838. Pithecheir, Cuvier, Hist. Nat. Mamm. vii., livr. 66, two pp. text.

Type Species.—*Pithecheir melanurus*, Cuvier.

Range.—Malacca (Selangor), Sumatra, and Java.

Number of Forms.—Two.

Characters.—(Two skulls only available for examination.) Infraorbital foramen and zygomatic plate approaching the type found in *Carpomys* and *Crateromys*. Rostrum and braincase medium; supraorbital ridges well developed in adult. Bullae very large, and strongly inflated; though perhaps not more so than in some Australian species of *Rattus*. Incisive foramina in front of toothrow, very broad, quite long. Palate broad.

Upper molars like those of *Crateromys* (next to be described); the outer row of cusps almost disappearing, the inner row and particularly the centre row large. M.1 with nine cusps, including a large posterointernal; T.9 vestigial. M.2 with T.1, three cusps in second lamina, and a third lamina composed of T.7 and T.8. M.3 with T.3, T.4 and T.5, and one main posterior cusp; evidently the posterointernal is absent in this tooth. Lower teeth without special peculiarity. Incisors moderate.

The reduction of the outer row is most marked in M.2 and M.3; least in M.1, in which T.3 is quite strong.

Tail very poorly haired in the two specimens seen, more or less reminiscent of the *Uromys* type. Hindfoot arboreal; hallux with small claw, but evidently fully opposable; D.5 long; plantar pads broad. Pollex less reduced than is usual, appearing as a wide knob. Jentink has noted several characters of this rare genus, such as "four well-developed inguinal nipples," "the clitoris is very large," and apparently the palate ridges are abnormal.

Forms seen: *melanurus*, *parvus*.

List of Named Forms

1. PITHECHEIR MELANURUS MELANURUS, Cuvier

1838. Lesson's Compl. Oeuvres de Buffon, 1, p. 447.
(?) W. Sumatra.

2. PITHECHEIR MELANURUS PARVUS, Kloss

1916. Journ. Fed. Malay States Mus. VI, p. 250.
Bukit Kutu, Selangor, Malay Peninsula.

I have seen two skins belonging to this genus, an adult (in spirit) from Java, and the type of *parvus*, from Selangor. The latter is not adult, and the claw on the hallux is more developed than in the Javanese specimen, which has it flattened and vestigial, and in which the hallux is obviously very widely opposable from the rest of the foot. Other than in this genus, it appears that when the hallux is widely opposable, the claw is suppressed (e.g., *Hapalomys*, *Chiromyscus*, *Chiropodomys*, etc.).

Genus 15. CRATEROMYS, Thomas

1895. CRATEROMYS, Thomas, Ann. Mag. Nat. Hist. 6, XVI, p. 163.

TYPE SPECIES.—*Phloeomys schadenbergi*, Meyer.

RANGE.—Luzon, Philippine Islands.

NUMBER OF FORMS.—One.

CHARACTERS.—Very large, one of the largest members of the subfamily. Skull with excessive constriction in the frontal region, this carried far backwards, so that the braincase is shortened. Zygomatic width considerable. Anterior zygomatic plate and infraorbital foramen with the Microtine aspect of *Carpomys* and *Batomys*. Occipital region of skull prominent. Palate relatively narrow. Bullae flattened, small. Palatal foramina well open and moderately long, but not reaching the toothrows. Upper cheekteeth with the centre and inner rows of cusps enlarged, the outer row small, usually tending to become fused with the cusps of the centre row. The cusps of the centre row form very sharp angles with their neighbours of the inner row. Postero-internal cusp strong in all three molars. The valley between the inner and central cusps well marked, and nearer the centre of the tooth than is usual. No reduction of M.3 has taken place in this genus; it is like M.2 in elements and size. M.2 and M.3 with the front lamina composed of T.1 only. Lower teeth with the terminal heel of M.1 and M.2 strong; the cusps of each lamina forming a sharp angle on their junction in the middle, strongly bent backwards from each other. M.3 large, the posterior lamina not reduced, but with two cusps. The molars are heavy, and quite hypsodont. Incisors moderate, not specially enlarged. External form much specialized; size very large; fur excessively thick and long. Tail long, extremely heavily haired and thickly bushy, as bushy as that of any Squirrel. Apart from the cranial and dental peculiarities, this feature alone is quite sufficient to distinguish *Crateromys* from any other member of the Murinae. Hindfoot broad, of arboreal type, D.5 nearly as long as the three central digits; hallux long, but not opposable evidently; claws powerful. Forefoot normal, with large, powerful claws. (Taylor, 1934, quotes 345 mm. as head and body length for this genus. I should imagine this measurement could not be exceeded.)

Forms seen: *schadenbergi*.

List of Named Forms

1. CRATEROMYS SCHADENBERGI, Meyer
1895. Abh. Mus. Dresden, 6, p. 1.
Mount Data, N. Luzon, Philippine Islands.

Genus 16. HYOMYS, Thomas

1903. Hyomys, Thomas, Proc. Zool. Soc. London, II, p. 198.

Type Species.—*Hyomys meeki*, Thomas.

Range.—New Guinea.

Number of Forms.—Three.

Characters.—Very large. Rostrum broad, heavy. Some interorbital constriction apparent between the powerful supraorbital ridges, which extend backwards over the braincase, though on the posterior part of the skull they are more faint. Braincase relatively narrow. Paroccipital process long. Small squamosal crests present in the type skull. Anterior part of the zygomatic plate nearly straight. Incisive foramina very short indeed, narrow, much reduced. Palate narrow and short. Bullae extremely reduced. Incisors extremely broad and powerful in all seen. Upper molars hypsodont, quite different from either *Crateromys* or *Mallomys*, the cusps obsolete and the pattern laminate in all skulls examined; posterointernal cusp present; traces of nine cusps in M.1, and seven in M.2; M.3 about as large as M.2, probably also with seven cusps originally. Lower teeth with terminal heel of M.1 and M.2 unusually large, appearing as an extra lamina on the inner side of the teeth. Essential external characters as in *Mallomys*. Size very large, head and body to 355 (Rümmler), or perhaps more; feet heavy; tail more or less completely naked, the scales appearing even rougher and more naked than in *Mallomys*; Thomas suggested that the "large pointed scales served a purpose analogous to that of the caudal climbing irons of *Anomalurus*." Mammae 0—2=4.

Hyomys is probably an isolated genus not nearly allied to any living form.

Forms seen: *meeki*.

List of Named Forms

1. HYOMYS MEEKI MEEKI, Thomas
1903. Proc. Zool. Soc. London, p. 198.
Avera, Aroa River, British New Guinea.

2. HYOMYS MEEKI DAMMERMANI, Stein
1933. Zeitschr. für Säugetierk. 8, p. 95.
Kunupi, Weyland Range, Dutch New Guinea.

3. HYOMYS STROBILURUS, Rümmler
1933. Zeitschr. für Säugetierk. 8, p. 96.
Sattelberg Mandated Territory, New Guinea.

Genus 17. MALLOMYS, Thomas

1898. MALLOMYS, Thomas, Nov. Zool. V, p. 1.
1907. DENDROSMINTHUS, de Vis, Ann. Queensland Mus. 7, p. 10.

TYPE SPECIES.—*Mallomys rothschildi*, Thomas.

RANGE.—New Guinea; and if the species *armandvillei* is correctly referred to the genus, Flores.

NUMBER OF FORMS.—Five.

CHARACTERS.—Very large. Skull extremely heavy, the anterior portion of the frontals much inflated. Supraorbital ridges strong; interorbital constriction moderate, the frontals depressed between the ridges. A small squamosal ridge present; between this and the inflation of the frontals is placed a deep concavity, on the internal wall of the orbit. Rostrum heavy. Incisors moderately broad. Paroccipital process well developed. Zygomatic plate broad, straight anteriorly; the infraorbital foramen of a peculiar shape, only slightly narrower below than above, due apparently to the swellings of the frontals. Incisive foramina in front of toothrow, very broad, and narrowed abruptly anteriorly. Palate much narrowed. Bullae very small. Molars much broadened, the cusps heavy, and angular; in this genus, the posterointernal cusp is suppressed in M.1 and M.2, thus differing from *Crateromys* and *Hyomys*; but is very strong in M.3. The centre row of cusps is large; the inner row also large, and forming in each case a sharp angle with the main cusps of the centre row; the outer row is little reduced. M.1 has eight cusps, and M.2 has T.1, T.4, 5, 6, and T.8 and 9 present, T.9 being joined to T.8, and little developed; M.3 with all the inner cusps (1, 4, and 7) present and strong, also T.5 and 6 on the second lamina, and T. 8 on the third. The lower teeth are like those of *Crateromys*; indeed, the whole pattern is not far removed from this genus, except for the suppression of the posterointernal cusp; but the cusps are stronger, and the pattern probably more nearly resembles that of of *Lenomys*.

Size large; head and body up to 416 mm. (Rümmler); fur thick; foreclaws considerably enlarged; hindfoot with large claws, moderate fifth digit; the foot large, heavy, more or less of arboreal type. Tail long, extremely coarsely scaled, almost devoid of hair.

Forms seen: *hercules*, *argentata*.

Mus armandvillei, Jentink, from Flores (head and body 420), is not represented in the British Museum, but has been referred to this genus. The molars figured by Jentink are unfortunately not sufficiently clear to say whether they agree exactly with the races of *rothschildi* described above. Tate states: "*Mus armandvillei* . . . appears from its short muzzle, palatal openings and molar series to be a thoroughly distinct species. Its complex molar crowns, though differing somewhat in pattern from those of *Mallomys*, indicate its general relationship to that genus." Both Tate and Rümmler refer all named forms from New Guinea to *rothschildi*.

List of Named Forms

1. MALLOMYS ROTHSCHILDI ROTHSCHILDI, Thomas

1898. Nov. Zool. V, p. 2.
Mount Murray, Wharton Range, New Guinea.
Synonym: *aroaensis*, de Vis, 1907, Ann. Queensland Mus. 7, p. 10.
Aroa River, New Guinea.
goliath, Milne-Edwards, 1900, Bull. Mus. Paris, VI, p. 165.
Aroa River, New Guinea.

2. MALLOMYS ROTHSCHILDI HERCULES, Thomas

1912. Nov. Zool. XIX, p. 92.
Rawlinson Mountains, S.-E. German New Guinea.

3. MALLOMYS ROTHSCHILDI WEYLANDI, Rothschild & Dollman

1933. Proc. Zool. Soc. London, p. 212.
Weyland Range, New Guinea.

4. MALLOMYS ROTHSCHILDI ARGENTATA, Rothschild & Dollman

1933. Proc. Zool. Soc. London, p. 212.
Weyland Range, New Guinea
Regarded by Rümmler as a synonym of *r. weylandi*.

5. MALLOMYS (?)ARMANDVILLEI, Jentink

1892. Weber's Zool. Ergebn. Reis. Nied. Ost. Ind. iii, p. 79.
Flores.

Genus 18. CONILURUS, Ogilby

1829. Hapalotis, Lichtenstein, Darst. neuer oder wenig bekannter Säugeth. Heft VI. *Hapalotis albipes*, Lichtenstein. (Not of Hübner.)
1838. Conilurus, Ogilby, Trans. Linn. Soc. London, XVIII, p. 124.

Type Species.—*Conilurus constructor*, Ogilby = *Hapalotis albipes*, Lichtenstein.

Range.—Australia: New South Wales and Northern Territory, also Melville Island.

Number of Forms.—Four.

Characters.—Skull considerably but not extremely constricted in the interorbital region; supraorbital ridges extremely weak or absent. Zygoma rising abruptly anteriorly to a considerable height, zygomatic plate sharply projecting forwards; rostrum moderately long. Incisive foramina long, extending to M.1, and in the type species much broadened. Palate broad. Bullae medium. Coronoid process of mandible vestigial. Incisors without peculiarities. M.1 with nine cusps, all quite well marked originally, except T.9, which is vestigial; the centre and outer row of cusps tend to become fused together to a degree; in old age all the cusps join, and the teeth become more or less laminate. M.1 evidently three-rooted. M.2 with T.1 and all cusps present on second and third lamina. M.3 with T.1, a full second lamina, and two cusps posteriorly, one of which probably represents T.7. In old age, T.3

in M.1 (the anteroexternal cusp) becomes vestigial. M.2 is relatively large, M.3 moderately so. Lower teeth mostly plain transverse plates in those examined. Terminal heel small but present in M.1 and M.2.

Tail usually nearly uniformly haired, the end always in those seen heavily tufted. Sometimes scales may be traced in the upper portion. Hindfoot moderately long; proportions of digits normal; plantar pads not reduced; fur soft; ear rather large.

The forms seen appear to divide into two groups, the type, a larger, heavier animal, with bi-coloured tail (dark above, white below), hindfoot 51 (few seen), and palatal foramina broadened; and the *penicillatus* group, tail not dark above and white below, but either wholly black or black with white terminal tuft; palatal foramina not specially broadened apparently; hindfoot not exceeding 45 in our specimens. Average measurements of ten members of *penicillatus* group: head and body, 179·7 (165–200); tail, 195 (180–215); hindfoot, 42·3 (40–45); ear, 27 (25–30).

Forms seen: *albipes*, *hemileucurus*, *melibius*, *penicillatus*.

List of Named Forms

albipes Group

1. CONILURUS ALBIPES, Lichtenstein

1829. Darst. neuer oder wenig bekannter Säugeth. Heft VI, pl. xxix.
New South Wales.
Synonym: *constructor*, Ogilby, 1837, Trans. Linn. Soc. London, XVIII, p. 126. New South Wales.

penicillatus Group

2. CONILURUS PENICILLATUS, Gould

1842. Proc. Zool. Soc. London, p. 12.
Port Essington, N. Australia.

3. CONILURUS MELIBIUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 431.
Melville Island, N. Australia.

4. CONILURUS HEMILEUCURUS, Gray

1858. Proc. Zool. Soc. London, 1857, p. 243.
N. Australia.

From the genus *Conilurus* Thomas has separated closely allied species under the names *Zyzomys*, *Laomys*, and *Mesembriomys*. One cannot escape the conviction that the characters separating these forms are trivial, and that perhaps a more correct idea of their relationships would be arrived at if all, or especially the first two named, were united in the one genus *Conilurus*. Ultimately it is likely that this may be done.

Genus 19. ZYZOMYS, Thomas

1909. Zyzomys, Thomas, Ann. Mag. Nat. Hist. 8, III, p. 372.

Type Species.—*Mus argurus*, Thomas.

RANGE.—Australia: South and North-west.

NUMBER OF FORMS.—Two.

CHARACTERS.—Skull small, with no extreme peculiarities; much like that of a small *Rattus*; no supraorbital ridges; rostrum rather long; braincase broad. Zygomatic plate slightly cut back above. Incisive foramina reaching toothrows. Bullae moderately small. Zygoma apparently a little less specialized than in *Conilurus*.

Upper teeth narrow, the posterointernal cusp well developed in M.1 and M.2; the outer row of cusps strongly reduced, tending to become fused with the centre row. M.3 rather small. An extra cusp is present in front of the foremost lamina of M.1 in the six skulls examined. Lower teeth without special peculiarities. Form slender, size small (head and body 93–109 in those seen). Tail well haired, though less so than in *Mesembriomys* and *Conilurus*; feet and digits normal. The tail is usually about equal to head and body, though it may be longer. (Average of four skins bearing measurements, head and body, 100·5 (93–109); hindfoot, 20·5 (20–21); ear, 16·75 (16–18).

Forms seen: *argurus*, *indutus*.

LIST OF NAMED FORMS

1. ZYZOMYS ARGURUS ARGURUS, Thomas

1889. Ann. Mag. Nat. Hist. 6, III, p. 433.
S. Australia.

2. ZYZOMYS ARGURUS INDUTUS, Thomas

1909. Ann. Mag. Nat. Hist. 8, III, p. 151.
Wyndham, N.-W. Australia.

Genus 20. LAOMYS, Thomas

1909. LAOMYS, Thomas, Ann. Mag. Nat. Hist. 8, III, p. 373.

TYPE SPECIES.—*Laomys woodwardi*, Thomas.

RANGE.—Northern Australia (West and Northern Territory).

NUMBER OF FORMS.—Three.

CHARACTERS.—Skull (two seen only) with considerable interorbital constriction; zygomatic plate with anterior border cut back above; rostrum and braincase of *Conilurus* type; palate broad; bullae small-medium; incisive foramina relatively long. Upper teeth in the type skull of the type species (much worn), in rows of plain transverse laminae, three in M.1, two in M.2, the foremost of which has an inner fold evidently representing the original space between T.1 and T.4; M.3 worn down, with elements untraceable. This type of tooth was compared by Thomas to those of *Phloeomys* and *Otomys*, but it seems much more likely that it merely represents a more or less normal or slightly modified *Conilurus* dentition much worn down. The type of *L. pedunculatus* has all the cusps of the *Conilurus* type present, including the posterointernal cusp; but M.3 in this skull has also the elements more or less obliterated. The lower molars are a series of transverse plates in both skulls. Zygoma near the *Conilurus* type. Coronoid process of mandible very low.

Fur crisp. Ear not enlarged. Form heavy; feet broad, the digits not abnormal. Tail completely haired, relatively short, thickened at base and tapering at tip.

Forms seen: *woodwardi, pedunculatus.*

List of Named Forms

1. LAOMYS PEDUNCULATUS PEDUNCULATUS, Waite

1896. Rep. Horn Sci. Exped. Centr. Austr. Zool. ii, p. 395.
Alice Springs, Central Australia.

2. LAOMYS PEDUNCULATUS BRACHYOTIS, Waite

1896. Rep. Horn Sci. Exped. Centr. Austr. Zool. ii, p. 397.
Illamurta, Central Australia.

3. LAOMYS WOODWARDI, Thomas

1909. Ann. Mag. Nat. Hist. 8, III, p. 373.
Parry's Creek, Wyndham, N.-W. Australia.

In *woodwardi*, the tail is considerably shortened, about 68 per cent of head and body length; but in *pedunculatus*, no skins of which have been examined, it is from descriptions apparently not specially reduced.

Genus 21. MESEMBRIOMYS, Palmer

1906. Ammomys, Thomas, Ann. Mag. Nat. Hist. 7, XVII, p. 84. Not of Bonaparte.
1906. Mesembriomys, Palmer, Proc. Biol. Soc. Washington, XIX, p. 97.

Type Species.—*Mus hirsutus*, Gould.

Range.—Northern Australia, from west to Queensland; Melville Island.

Number of Forms.—Four.

Characters.—Skull large, heavy, at extreme development larger than any member of *Rattus*. Rostrum thick; frontals markedly inflated just behind their junction with the nasals, behind which the skull slants downwards gradually. Braincase not large. Frontals depressed between the very weak supraorbital ridges. Anterior zygomatic plate cut back above, the zygoma more normal than in *Conilurus*, not rising so high anteriorly. Incisors considerably thickened from before backwards. Incisive foramina large, but not reaching toothrows, which are relatively short. Palate broad. Bullae rather large. Mandible with low coronoid process.

Molars much as in *Conilurus*, but rather more complex. The cusps tend to wear down in adult so that the pattern is more or less laminate. Nine cusps present in M.1; T.9 is small. Seven cusps in M.2, and six in M.3, as in *Conilurus*. The extra front cusp (in front of foremost lamina of M.1), characteristic of several of these Australian genera of Rats, is here usually present though very small, in some specimens two such cusps or even more are visible.

M.3 is considerably reduced. The outer row of cusps tends to merge into the central row; the inner row is strong, and each cusp tends to be situated rather behind its neighbour on the centre row. M.1 is three-rooted. The postero-internal cusp of M.1 and M.2 is well developed. Lower teeth not abnormal; terminal heel of M.1 and M.2 large.

Externally large; head and body up to 350 mm. Fur rather rough; ear moderate; foreclaws rather large. Hindfoot relatively broad, with large claws; D.5 and the hallux proportionately large. Tail considerably longer than head and body (in *macrurus* extremely so); the tail is well haired comparatively, the end heavily tufted. Near the body it is less well haired and the scales may be traced. Mammae 0—2=4. Plantar pads 6.

These Rats evidently have a good length of life, at any rate in captivity; the first ones to be represented in the London Zoological Gardens are mostly still alive, nearly four years after their arrival.

Two well-marked species occur: *macrurus*, smaller, back lighter-coloured, tail much longer (only two specimens seen: head and body, 260, 240; tail, 350, 370; hindfoot, 60, 60; ear, 30, 30), and the type species (average and extremes of eight skins bearing measurements: head and body, 303·7 (240–350); tail, 347 (270–390); hindfoot, 64·5 (60–70); ear, 39·3 (35–40)). Colour darker.

Forms seen: "*hirsutus*" (=*gouldi*), *melvillensis*, *macrurus*, *rattoides*.

List of Named Forms

gouldi Group

1. MESEMBRIOMYS GOULDI GOULDI, Gray

1843. List. Spec. Mamm. Brit. Mus. p. 116.
Port Essington, N. Australia.
Synonym: *hirsutus*, Gould, 1842, Proc. Zool. Soc. London, p. 12; not of Elliot.

2. MESEMBRIOMYS GOULDI RATTOIDES, Thomas

1924. Ann. Mag. Nat. Hist. 9, XIII, p. 296.
Cooktown, N. Queensland.

3. MESEMBRIOMYS GOULDI MELVILLENSIS, Hayman

1936. Ann. Mag. Nat. Hist. 10, XVII, p. 366.
Melville Island, N. Australia.

macrurus Group

4. MESEMBRIOMYS MACRURUS, Peters

1876. Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 355.
Mermaid Strait, near Roeburne, W. Australia.
Synonym: *boweri*, Ramsay, 1887, Proc. Linn. Soc. N.S.W. 2, 1, p. 1153. N.-W. Australia.

In the remaining genera, excepting the aberrant *Beamys* and *Saccostomus*, there is no posterointernal cusp in the first and second upper molars in the adult.

Genus 22. OENOMYS, Thomas

1904. Oenomys, Thomas, Ann. Mag. Nat. Hist. 7, XIII, p. 416.

Type Species.—*Mus hypoxanthus*, Pucheran.

Range.—African: Kenya, Uganda; Gold Coast, Gaboon, Congo; Angola.

Number of Forms.—Ten.

Characters.—Skull with moderate or little interorbital constriction, strong supraorbital ridges, large interparietal, and long heavy rostrum. Anterior border of zygomatic plate cut back above. Palate relatively narrow; bullae rather large. Incisive foramina well open, large and long.

Upper cheekteeth broad, complex, originally with very high cusps, and deep longitudinal valleys separating the three rows. M.1 with T.9 vestigial, and wearing out; T.7 absent; all other cusps present; the centre row the largest, but not excessively enlarged at the cost of the outer row; M.2 with T.1 and T.3, the three cusps of the second lamina, and only one cusp fully developed of the last lamina (the central, T.8). M.3 relatively very large, with the same abnormal elements as in *Golunda* or *Mylomys*, the outer row almost entirely suppressed, though a very small anteroexternal cusp may be traced; otherwise there are four main cusps only. M.1 is five- or six-rooted. The pattern is clearly traceable, even in old age; it is like that of *Thamnomys venustus*, only less complex, and with the posterointernal cusp suppressed. Terminal heel of lower molars relatively very small; M.3 with only one cusp fully developed on posterior lamina; the outer subsidiary row of cusps can be well developed; the cusps of the two rows large.

Mammae 2—1 = 6 (St. Leger). Tail poorly haired, as a rule longer than head and body. D.5 hindfoot rather long; feet not abnormal.

According to Tullberg, the dentition of this genus may be regarded as specialized for a vegetarian diet, a specialization which is accompanied by complexity of the digestive organs.

Forms seen: *bacchante*, *editus*, *hypoxanthus*, *moerens*, *oris*, *ornatus*, *unyori*.

It is not clear whether there is more than one valid species in this genus or not. *O. ornatus* appears to be based on a young specimen.

List of Named Forms

1. OENOMYS HYPOXANTHUS HYPOXANTHUS, Pucheran

1855. Rev. Zool. VII, p. 206.
Gaboon, Western Africa.
Synonym: *rufinus*, Matschie, Deutsch. Ost. Afr. 3, 1, 52, 1895.

2. OENOMYS HYPOXANTHUS UNYORI, Thomas

1903. Ann. Mag. Nat. Hist. 7, XII, p. 343.
Fadjas, Victoria Nile, Unyoro, Uganda.

3. OENOMYS HYPOXANTHUS ANCHIETAE, Bocage

1890. Jorn. Sci. Lisb. p. 11.
Coanza, N. Angola.

4. OENOMYS HYPOXANTHUS BACCHANTE, Thomas

1903. Ann. Mag. Nat. Hist. 7, XII, p. 342.
Nandi, Kenya.

5. OENOMYS HYPOXANTHUS MOERENS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 379.
Solai, Mount Kenya.
Probably a synonym of *h. bacchante* (G. M. Allen).

6. OENOMYS HYPOXANTHUS VALLICOLA, Heller

1914. Smiths. Misc. Coll. LXIII, 7, p. 11.
Lake Naivasha, Kenya.

7. OENOMYS HYPOXANTHUS EDITUS, Thomas & Wroughton

1910. Trans. Zool. Soc. London, XIX, p. 509.
Mubuku Valley, E. Ruwenzori, Uganda.

8. OENOMYS HYPOXANTHUS MARUNGENSIS, Noack

1887. Zool. Jahrb. p. 231.
Qua Mpala, Marungu, S.-E. Congo.

9. OENOMYS HYPOXANTHUS ORIS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 380.
Kinangop, Aberdare Mountains, Kenya.
Probably a synonym of *h. bacchante* (G. M. Allen).

10. OENOMYS ORNATUS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 378.
Bibianaha, Gold Coast.

Genus 23. MYLOMYS, Thomas

1906. MYLOMYS, Thomas, Ann. Mag. Nat. Hist. 7, XVIII, p. 224.

TYPE SPECIES.—*Mylomys cuninghamei*, Thomas.

RANGE.—African: Sudan, Kenya, Uganda, Congo (Leopoldville and Uelle region), Gold Coast.

NUMBER OF FORMS.—Seven.

CHARACTERS.—Molars of the *Golunda* type, if less extreme, but M.1 remaining the dominant tooth in old age, and the inner row of cusps of upper molars not specially enlarged. Cusps of molars very prominent; "in each lamina of the upper series the centre cusp is raised in the middle to a point and curved backwards, its grinding surface pointed backwards and deeply concave, its enamel walls sharp and angular." M.1 with all cusps present except T.7, but T.9 is strongly reduced; M.2 with T.1, the three cusps of the second lamina, and T.8; M.3 with four cusps in all, as in *Golunda*, a large centre one, which has T.1 in front of it, a small cusp behind it, and a moderate-sized cusp on the inner side of it. M.1 evidently seven-rooted. Lower molars like those of *Golunda*, but the cusps even more raised up.

Upper incisors one-grooved; lower incisors plain. All rows of upper molars closely crowded together.

Skull with heavy rostrum, strong supraorbital ridges, moderate interorbital constriction, large interparietal; zygomatic plate low anteriorly, but very sharply cut back above; palate narrow; bullae rather large; palatal foramina narrowed posteriorly, long, reaching front molars; zygoma thick.

Fifth digit of forefoot so reduced that there appear to be three functional digits only on manus. Hindfoot with three centre digits rather long in appearance, D.5 much shortened, about as long as the hallux. Form thickset; tail moderately haired.

The unusually heavily cuspidate dentition will distinguish this genus sufficiently from *Pelomys* or any of the more *Rattus* or *Arvicanthis*-like Rats of Africa, while from the Indian *Golunda* it is distinguished by the inner row of the upper molars not being specially enlarged; it therefore presents a less aberrant dentition than that genus.

Forms seen: *alberti*, *christyi*, *cuninghamei*, *lowei*, *lutescens*, *roosevelti*.

According to Hayman, all forms should be regarded as races of the type species, a view which I fully support.

List of Named Forms

1. MYLOMYS CUNINGHAMEI CUNINGHAMEI, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 225.
East of Aberdare Mountains, Kenya.

2. MYLOMYS CUNINGHAMEI CHRISTYI, Thomas

1917. Ann. Mag. Nat. Hist. 8, XX, p. 362.
Mount Baginzi, Bahr-el-Ghazal, Sudan.

3. MYLOMYS CUNINGHAMEI MASSAICUS, Lönnberg

1916. Ark. Zool. 10, no. 12, p. 8.
El Donyo, Sabruk, Kenya.

4. MYLOMYS CUNINGHAMEI ROOSEVELTI, Heller

1910. Smiths. Misc. Coll. LIV, no. 1924, p. 1.
Nzoia River, Guas Ngishu Plateau, Kenya.

5. MYLOMYS CUNINGHAMEI LUTESCENS, Thomas

1915. Ann. Mag. Nat. Hist. 8, XVI, p. 149.
Nalasanji, S.-W. Uganda.

6. MYLOMYS CUNINGHAMEI ALBERTI, Thomas

1915. Ann. Mag. Nat. Hist. 8, XVI, p. 148.
Poko, Upper Uelle, Congo.

7. MYLOMYS CUNINGHAMEI LOWEI, Hayman

1935. Proc. Zool. Soc. London, p. 934.
Wenchi, Ashanti, Gold Coast.

Genus 24. DASYMYS, Peters

1875. Dasymys, Peters, Monatsber. K. Preuss, Akad. Wiss. Berlin, p. 12.

Type Species.—*Dasymys guienzii*, Peters = *Mus incomtus*, Sundevall.

Range.—African: Sudan, Kenya, Uganda, Abyssinia; Liberia, North

Nigeria, Congo; Angola, Rhodesia, South-west Africa, South Africa.

Number of Forms.—Sixteen.

Characters.—Skull with extreme interorbital constriction (on average about 12·6 per cent of occipitonasal length, a measurement usually below any group of *Rattus*); this constriction is further forward than in *Stenocephalemys*, another African genus with this character, so that the braincase appears less shortened. Supraorbital ridges usually strong, extending over braincase to a greater or lesser degree. Nasals broad; rostrum heavy, rather short. Zygomatic plate broad, the anterior border concave, then sharply cut back above. Zygoma robust, the jugal rather long. Palate usually much narrowed. Incisive foramina narrow, slit-like, long, extending to toothrow. Bullae moderate. Upper and lower incisors very broad; the lower incisor root tends to show on mandible more than is usual.

Cheekteeth originally extremely heavily cusped, reminiscent to a degree of those of *Mastacomys*; but the cusps quickly wearing down. Each cusp, when cutting, is considerably raised up. The centre row is large. M.1 with a small T.1 and all other cusps except T.7; T.9 is vestigial. M.2 with T.1, the second and third laminae like those of M.1. M.3 with T.1 and two roughly equal-sized laminae, each bearing originally three cusps, therefore the posterointernal cusp has in this tooth not become suppressed. In adult, the posterior lamina of M.3 is barely or not narrower than the anterior one, differing in this respect from *Arvicanthis*. Gradually, with wear, M.3 appears to become longer than M.2, and sometimes even longer than M.1. In extreme age the cusps are obliterated, and the spaces between original laminae may isolate as enamel islands. It is very rare for M.3 to be smaller than M.2, and it is never appreciably so; very generally it is slightly larger. M.1 is five-rooted. In two examples seen, M.3 has a trace of an extra fourth lamina posteriorly. In the lower teeth the laminae are as usual; M.3 is not much enlarged; the terminal heel of M.1 and M.2 is almost suppressed. There is a tendency for the cusps to become obliterated. In the young, the first lower molar has an extra cusp in front of the foremost lamina.

Form thickset and heavy, often very soft-furred. Hindfoot moderately broad, the three centre digits appearing elongated, the two outer digits not reduced, and of normal proportions. Forefoot with D.5 rather short. Tail usually slightly shorter than head and body, not well haired, though the degree of hairiness varies.

This genus appears to be most nearly allied to the *Arvicanthis* series of Rats. Mammae 1—2=6 (Shortridge).

Forms seen: *bentleyae*, *foxi*, *fuscus*, *helukus*, *incomtus*, *montanus*, *nudipes*, *medius*, *rufulus*, *shawi*.

It appears very unlikely that there is more than one species of this genus.

All are regarded here as races of *incomtus*, except perhaps *orthos* (not seen), which is said to have the concavity on anterior border of zygomatic plate scarcely marked.

List of Named Forms

1. DASYMYS INCOMTUS INCOMTUS, Sundevall

1847. Ofvers. Akad. Forh. Stockholm, 1846, p. 120.
Near Durban, Natal, S. Africa.
Synonym: *gueinzii*, Peters. 1875. Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 13. Port Natal.

2. DASYMYS INCOMTUS FUSCUS, de Winton

1896. Proc. Zool. Soc. London, p. 804.
Mazoe, Mashonaland.

3. DASYMYS INCOMTUS CAPENSIS, Roberts

1936. Ann. Transv. Mus. XVIII, p. 254.
La Plisante, Wolseley, Cape Province.

4. DASYMYS INCOMTUS GRISEIFRONS, Osgood

1936. Field. Mus. Pub. Zool. Ser. XX, p. 255.
South-west side of Lake Tana, near Dungulbar, Gojjam, Abyssinia.

5. DASYMYS INCOMTUS NUDIPES, Peters

1870. Jorn. Sci. Lisb. p. 126.
Huilla, Angola.

6. DASYMYS INCOMTUS EDSONI, Hatt

1934. Amer. Mus. Nov. 708, p. 6.
Lukolela, Middle Congo.

7. DASYMYS INCOMTUS MONTANUS, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 143.
E. Ruwenzori, Uganda.

8. DASYMYS INCOMTUS BENTLEYAE, Thomas

1892. Ann. Mag. Nat. Hist. 6, X, p. 179.
Ngombi, Lower Congo.

9. DASYMYS INCOMTUS MEDIUS, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 143.
Mubuku Valley, E. Ruwenzori, Uganda.

10. DASYMYS INCOMTUS HELUKUS, Heller

1910. Smiths. Misc. Coll. LIV, no. 1924, p. 2.
Sirgoit, Guas Ngishu Plateau, Kenya.

11. DASYMYS INCOMTUS NIGRIDIUS, Hollister

1916. Smiths. Misc. Coll. LXVI, no. 10, p. 2.
Naivasha, Kenya.

12. DASYMYS INCOMTUS SAVANNUS, Heller

1911. Smiths. Misc. Coll. LVI, no. 17, p. 14.
Fort Hall, Kenya.

13. DASYMYS INCOMTUS SHAWI, Kershaw

1924. Ann Mag. Nat. Hist. 9, XIII, p. 25.
Mount Baginzi, Bahr-el-Ghazal, Sudan.

14. DASYMYS INCOMTUS FOXI, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 685.
Panyam, N. Nigeria.

15. DASYMYS INCOMTUS RUFULUS, Miller

1900. Proc. Acad. Sci. Washington, II, p. 639.
Mount Coffee, Liberia.

16. DASYMYS ORTHOS, Heller

1911. Smiths. Misc. Coll. LVI, No. 17, p. 13.
Butiaba, Albert Nyanza, Uganda.

St. Leger states that the character of the loosely knit metatarsals present in *Colomys* and *Malacomys* is present to a degree in this genus. Compared with these genera, apart from its dental peculiarities, the length of the foot in *Dasymys* is on average much less, about 20 per cent of the head and body length, against the averages 24 per cent for *Malacomys*, and 29 per cent for *Colomys*.

Genus 25. ARVICANTHIS, Lesson

1842. ARVICANTHIS, Lesson, Nouv. Tabl. Regn. Anim. Mamm., p. 147.
1842. ISOMYS, Sundevall, K. Svenska Vet. Akad. Handl. Stockholm, p. 219. (*Mus variegatus*, Brants.)

TYPE SPECIES.—*Lemmus niloticus*, Geoffroy.

RANGE.—African, including Palaearctic eastern portion: Egypt; South Arabia; Sahara (Asben); Sudan, Abyssinia, Somaliland, Kenya, Uganda, Tanganyika; Portuguese Guinea, Sierra Leone, Gold Coast, North Nigeria, East Congo; North Rhodesia.

NUMBER OF FORMS.—About thirty-six.

CHARACTERS.—Skull with gradual and moderate interorbital constriction, and strong supraorbital ridges; rostrum broad, and short in appearance; braincase not broad. Incisors relatively thick; zygoma powerful, often broadened in centre. Zygomatic plate higher than in *Lemniscomys*, sharply cut back above, this portion strongly projecting forwards. Bullae large to very large. Palate tending to be narrowed. Incisive foramina long, usually reaching toothrow, and narrowed posteriorly.

Cheekteeth broad, tending to be rather shortened (particularly M.2); dentition heavy. M.3 usually about as large as M.2; in worn specimens this tooth, as in *Dasymys*, tends to become rather longer than M.2. The cusps originally well marked, but the teeth tending to become more or less laminate with wear, rather early; to a greater degree than in the allied *Rhabdomys* and *Lemniscomys*. The centre row of cusps in the upper molars is relatively broadened; T.9 is reduced in M.1 and M.2, and sometimes tends to disappear; T.3 is rather reduced in M.1, normally absent or vestigial in M.2; M.1 appears seven-rooted. M.3 with T.1, a main lamina, little curved, behind it, and a posterior lamina which is narrowed; the posterointernal cusp probably never occurs in this tooth (compare *Dasymys*). The inner row of cusps is well developed. Some specimens seen, from Abyssinia, appear to come very near the formation of pattern found in the subgenus *Desmomys*, though their incisors are plain; this group seems to connect *Arvicanthis* very closely indeed with *Pelomys*. Lower molars usually laminate, with cusps obsolete. The terminal heel of M.1 and M.2 are much reduced originally, apparently. Mandible robust.

A faint mid-dorsal stripe may be present. Fur rough. D.5 in forefoot strongly shortened, but not vestigial, and bearing claw. Hindfoot with the three centre digits often appearing rather long, the two outer digits subequal and strongly reduced. Tail relatively well haired, as a rule shorter than head and body.

Forms seen: *abyssinicus*, *ansorgei*, *centralis*, *chanleri*, *fluvicinctus*, *luctuosus*, "*minor*," *mordax*, *nairobae*, *neumanni*, *niloticus*, *nubilans*, *occidentalis*, *pallescens*, *pelliceus*, *praeceps*, *reptans*, *rubescens*, *rufinus*, *rumruti*, *saturatus*, *setosus*, *solatus*, *somalicus*, *tenebrosus*, *testicularis*, "*variegatus*," *virescens*, *zaphiri*.

There appears to be little essential difference between the described distinct species.

List of Named Forms

1. ARVICANTHIS NILOTICUS NILOTICUS, Desmarest

1822. Mammalogie, pt. 2, p. 281.
Egypt.
Synonym: *variegatus*, Lichtenstein, 1823, Doubl. Verz. Berl. Mus. p. 2.
(?) *ochropus*, Heuglin, Reise N. Ost. Afr. II, p. 68, 1877. Bogos, Eritrea.
minor, Sundevall, 1842, 1843, K. Svenska. Vet. Akad. Handl. Stockholm, p. 221.
major, Sundevall, same reference, p. 220.
discolor, Wagner, Arch. f. Naturg. 8, I, p. 9, 1842.

2. ARVICANTHIS NILOTICUS TESTICULARIS, Sundevall

1842. K. Svenska. Vet. Akad. Handl. Stockholm, p. 221.
White Nile, Sudan.

3. ARVICANTHIS NILOTICUS NASO, Pocock

1934. Ann. Mag. Nat. Hist. 10, XIV, p. 636.
Lahej, near Aden, S. Arabia.

4. ARVICANTHIS NILOTICUS SOLATUS, Thomas

1925. Ann. Mag. Nat. Hist. 9, XVI, p. 194.
Aouderas, Asben, W. Sahara.

5. ARVICANTHIS NILOTICUS CENTRALIS, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 338.
Chak-Chak, W. Bahr-el-Ghazal.

6. ARVICANTHIS NILOTICUS KORDOFANENSIS, Wettstein

1916. Anz. Akad. Wiss. Wien. 53, p. 162.
Kadugli, S. Kordofan.

7. ARVICANTHIS NILOTICUS JEBELAE, Heller

1911. Smiths. Misc. Coll. LVI, no. 17, p. 9.
Rhino Camp, Lado Enclave.

8. ARVICANTHIS NILOTICUS LUCTUOSUS, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 339.
Kaka, Fashoda, White Nile.

9. ARVICANTHIS NILOTICUS SETOSUS, Thomas

1905. Ann. Mag. Nat. Hist. 7, XV, p. 79.
Fra Fra country, Gold Coast Hinterland.

10. ARVICANTHIS NILOTICUS OCCIDENTALIS, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 377.
Bo, Sierra Leone.

11. ARVICANTHIS NILOTICUS RUFINUS, Temminck

1853. Esq. Zool. Côte de Guiné, p. 163.
Elmina, Gold Coast.
Synonym: *mordax*, Thomas, 1911, Ann. Mag. Nat. Hist. 8, VII, p. 460. Panyam, N. Nigeria.

12. ARVICANTHIS NILOTICUS ANSORGEI, Thomas

1910. Ann. Mag. Nat. Hist. 8, V, p. 353.
Gunnal, Portuguese Guinea.

13. ARVICANTHIS LACERNATUS, Rüppell

1842. Mus. Senckenb. III, p. 96, 115, pl. vi, fig. 1.
Grassy plains about Lake Dembea (=Lake Tana), Abyssinia.
Synonym: *pelliceus*, Thomas, 1928, Ann. Mag. Nat. Hist. 10, I, p. 302. Lake Tana, Abyssinia. (Status *fide* Osgood.)

14. ARVICANTHIS ABYSSINICUS ABYSSINICUS, Rüppell

1842. Mus. Senckenb. III, p. 104.
Entschetqab, Simen Province, Abyssinia.
Synonym: *reichardi*, Noack, 1887, Jahrb. Zool. 2, p. 235.

15. ARVICANTHIS ABYSSINICUS SATURATUS, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 343.
Didessa River, near Guma, Abyssinia.

16. ARVICANTHIS ABYSSINICUS BLICKI, Frick

1914. Ann. Carnegie Mus. 9, p. 20.
Hora Mountain, S. Chilalo Mountains, S. Abyssinia.

17. ARVICANTHIS ABYSSINICUS MEARNSI, Frick

1914. Ann. Carnegie Mus. 9, p. 22.
Sadi Malka, Hawash River, S. Abyssinia.

18. ARVICANTHIS ABYSSINICUS RAFFERTYI, Frick

1914. Ann. Carnegie Mus. 9, p. 23.
Gardula, S. Abyssinia.

19. ARVICANTHIS ABYSSINICUS FLUVICINCTUS, Osgood

1936. Field. Mus. Pub. Zool. ser. XX, p. 251.
Bichana, Gojjam, Abyssinia.

20. ARVICANTHIS ABYSSINICUS PRAECEPS, Wroughton

1909. Ann. Mag. Nat. Hist. 8, IV, p. 538.
Naivasha, Kenya.

21. ARVICANTHIS ABYSSINICUS NUBILANS, Wroughton

1909. Ann. Mag. Nat. Hist. 8, IV, p. 539.
Kisumu, Kenya.

22. ARVICANTHIS ABYSSINICUS VIRESCENS, Heller

1914. Smiths. Misc. Coll. LXIII, 7, p. 11.
Voi, Kenya.

23. ARVICANTHIS ABYSSINICUS NAIROBAE, Allen

1909. Bull. Amer. Mus. Nat. Hist. XXVI, p. 168.
Nairobi, Kenya.

24. ARVICANTHIS ABYSSINICUS PALLESCENS, Dollman

1914. Abstr. Proc. Zool. Soc. London, p. 25; Proc. Zool. Soc. London, p. 316.
Loita Plains, Kenya.

25. ARVICANTHIS ABYSSINICUS RUBESCENS, Wroughton

1909. Ann. Mag. Nat. Hist. 8, IV, p. 538.
Kibero, Unyoro, Uganda.

26. ARVICANTHIS ABYSSINICUS CENTROSUS, Hollister

1916. Smiths. Misc. Coll. LXVI, 10, p. 1.
Rhino Camp, Lado Enclave.

27. ARVICANTHIS ABYSSINICUS MUANSAE, Matschie

1911. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 339.
Mwanza, Lake Victoria, Tanganyika.

28. ARVICANTHIS ABYSSINICUS NEUMANNI, Matschie

1894. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 204.
Irangi, Tanganyika.

29. ARVICANTHIS ABYSSINICUS ROSSII, de Beaux

1925. Atti Soc. Ital. Sci. Nat. LXIV, p. 90.
Atalia, Semliki Valley, E. Congo.

30. ARVICANTHIS ABYSSINICUS ZAPHIRI, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 349.
Guma, S. Abyssinia.

31. ARVICANTHIS ABYSSINICUS RUMRUTI, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 350.
Rumruti, Laikipia Plateau, Kenya.

32. ARVICANTHIS ABYSSINICUS TENEBROSUS, Kershaw

1923. Ann. Mag. Nat. Hist. 9, XI, p. 595.
Tabora, Tanganyika.
(Listed as full species by G. M. Allen, 1939.)

33. ARVICANTHIS ABYSSINICUS RHODESIAE, St. Leger

1932. Ann. Mag. Nat. Hist. 10, X, p. 85.
Sesheke district, N. Rhodesia.
(Race of *tenebrosus* according to G. M. Allen.)

34. ARVICANTHIS SOMALICUS SOMALICUS, Thomas

1902. Proc. Zool. Soc. London, p. 312.
Shuk, N. Somaliland.

35. ARVICANTHIS SOMALICUS REPTANS, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 129.
Nyama Nyangu, N. Guaso Nyiro, Kenya.

36. ARVICANTHIS SOMALICUS CHANLERI, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 130.
Chanler Falls, N. Guaso Nyiro, Kenya.

The following name may belong in this genus, or in *Lemniscomys*: *lineato-affinis*, Hedenborg, 1839, Isis, p. 9, nom. nud.(?)

Genus 26. HADROMYS, Thomas

1911. HADROMYS, Thomas, Journ. Bombay Nat. Hist. Soc. XX, p. 999.

TYPE SPECIES.—*Mus humei*, Thomas.

RANGE.—Manipur (Assam-Burma boundary).

NUMBER OF FORMS.—One.

CHARACTERS.—This genus is represented, so far as the British Museum is concerned, by four broken skulls, all of which lack bullae, and all of which have the cheekteeth too worn-out for definite notes. At the present state of our knowledge, it is by no means easily distinguished generically from *Arvicanthis*.

Rostrum broad, and short, as in *Arvicanthis* or *Golunda*. Supraorbital ridges well marked. Zygomatic plate concave anteriorly, then sharply cut back above. Incisive foramina long, narrow, reaching toothrows. Incisors relatively very powerful and broad, but not grooved. M.3 very little reduced, scarcely smaller than M.2, though rather narrower than that tooth. Dentition perhaps not highly abnormal, but too worn on specimens seen for notes.

Mammae 2—2=8. Fur thick and soft. Outer digit of manus (D.5) extremely short, but with claw. Hindfoot rather narrow; D.5 very slightly longer than the hallux, the two outer digits strongly reduced. Tail quite well haired, longer than head and body.

It is to be hoped that more specimens of this interesting Mouse will come to hand. The size is smaller than is usual in *Arvicanthis*.

Forms seen: *humei*.

LIST OF NAMED FORMS

1. HADROMYS HUMEI, Thomas
1886. Proc. Zool. Soc. London, p. 63.
Moirang, Manipur.

Genus 27. PELOMYS, Peters

1852. PELOMYS, Peters, Monatsb. K. Preuss. Akad. Wiss. Berlin, p. 275.
1910. DESMOMYS, Thomas, Ann. Mag. Nat. Hist. 8, V, p. 284. *Pelomys harringtoni*, Thomas. Valid as a subgenus.
1924. KOMEMYS, de Beaux, Ann. Mus. Civ. Stor. Nat. Genoa, 51, p. 207. *Komemys isseli*, de Beaux. Valid as a subgenus.

TYPE SPECIES.—*Mus (Pelomys) fallax*, Peters.

RANGE.—African: Kenya, Uganda, Abyssinia, Kome Island (Lake Victoria), Congo, Angola, Rhodesia, Nyasaland, Mozambique, South-west Africa.

NUMBER OF FORMS.—About fifteen.

CHARACTERS.—In this genus, I include all the *Arvicanthis*-like Rats from Africa in which the incisors are grooved, except *Mylomys*.

In the typical subgenus the forefoot has the outer digit vestigial, lacking the claw. This character is present in members of the subgenus *Desmomys*, except *dembeensis*. In subgenus *Komemys*, the fifth finger, though strongly shortened, bears a small claw.

The upper incisors are one-grooved, clearly in the typical subgenus, and *Komemys*; faintly in *Desmomys*. The latter connects typical *Pelomys* with *Arvicanthis* closely in some ways.

In typical *Pelomys*, the cheekteeth are broad; originally the cusps are very prominent, though less extreme than in *Mylomys* or *Oenomys*; apparently the cusps are longer preserved than in *Arvicanthis*. M.3 is often scarcely smaller than M.2; the teeth are broad, the centre row of cusps is enlarged and broadened. Lower incisors plain. Skull essentially as in *Arvicanthis*.

Tail quite well haired, usually about as long as head and body. Fur rather rough. Hindfoot about as in *Arvicanthis*, the outer digits strongly shortened, D.5 scarcely longer than the hallux. Mammae 2—2 = 8 (Shortridge).

Desmomys contains rare and little-known species, from Abyssinia, in which the grooving of the incisors is faint, and the molars tend to approach those of *Oenomys*, though the pattern of the few specimens seen is not so extreme as in *Oenomys*, and there seems no need to refer this group to a genus distinct from *Pelomys*. M.3 is as in *Oenomys*, with the outer row reduced, or more so than in *Pelomys* s.s. The species *dembeensis*, referred ultimately by Thomas to *Arvicanthis*, has molars as in the present group, faintly grooved incisors, and is not an *Arvicanthis* as I understand that genus, if our specimens are correctly identified, but I have not seen the type. The few specimens seen have a small claw on the much-reduced fifth finger (as in *Arvicanthis*), and incidentally intermediate between normal *Pelomys* or normal *Desmomys* and *Komemys*. The species *rex* appears to be an unusually large form (head and body, 212 mm.); the skull is not represented in London.

Komemys from Kome Island has a rather low zygomatic plate; the fifth finger of forefoot bears a small claw, though it is strongly reduced; there is a well-marked middorsal stripe present on the back, and the tail is longer than the head and body. I have seen only two specimens, the molars being too worn for notes; but *Komemys* is regarded as a subgenus only of *Pelomys* by Hatt, 1935, and G. M. Allen, 1939. According to these authors, the form *minor* should be referred to the subgenus. I have seen very few of the latter.

Forms seen: *australis*, *campanae*, *concolor*, *dembeensis*, *fallax*, *frater*, *harringtoni*, *isseli*, *insignatus*, *minor*, *rex*.

List of Named Forms

(I think it is very unlikely that there is more than one valid species in the typical subgenus.)

Subgenus *Pelomys*, Peters

1. PELOMYS FALLAX FALLAX, Peters

1852. Reise nach Mossambique: Zool. Säugeth. p. 157.
Caya, Zambesi River, Portuguese E. Africa.

2. PELOMYS FALLAX IRIDESCENS, Heller

1912. Smiths. Misc. Coll. LIX, no. 16, p. 12.
Mount Mbololo, Taita Hills, Kenya.

3. PELOMYS FALLAX CONCOLOR, Heller

1912. Smiths. Misc. Coll. LIX, no. 16, p. 13.
Kiduha, Lake Mutanda, Uganda.

4. PELOMYS FALLAX INSIGNATUS, Osgood

1910. Ann. Mag. Nat. Hist. 8, V, p. 276.
Fort Hill, N. Nyasa.

5. PELOMYS FALLAX AUSTRALIS, Roberts

1913. Ann. Transv. Mus. IV, p. 90.
Mazambeti, Beira, Portuguese E. Africa.

6. PELOMYS FALLAX RHODESIAE, Roberts

1929. Ann. Transv. Mus. XIII, p. 118.
Machili River, N.-W. Rhodesia.

7. PELOMYS LULUAE, Matschie

1926. Zeitschr. für Säugetierk. 1, p. 113.
Luluabourg, Kasai, S. Congo.

8. PELOMYS CAMPANAE, Huet

1888. Le Naturaliste, p. 143.
Landana, north of Congo River, west coast Angola.

9. PELOMYS FRATER, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIII, p. 415.
Braganza, N. Angola.

10. PELOMYS DYBOWSKII, Pousargues

1893. Bull. Soc. Zool. XVIII, p. 163.
River Kemo, north of Ubangui, French Congo.

Subgenus *Desmomys*, Thomas

11. PELOMYS HARRINGTONI, Thomas

1902. Proc. Zool. Soc. London, p. 313.
Kutai, W. Shoa, Abyssinia.

12. PELOMYS DEMBEENSIS, Rüppell

1845. Mus. Senckenb. III, pp. 109, 116, pl. VI, fig. 3.
Dembea, Abyssinia.

13. PELOMYS REX, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 304.
Charada Forest, Kaffa, Abyssinia.

Subgenus *Komemys*, de Beaux

14. PELOMYS MINOR, Cabrera & Ruxton

1926. Ann. Mag. Nat. Hist. 9, XVII, p. 601.
Luluabourg, Kasai, S. Congo.

15. PELOMYS ISSELI, de Beaux

1924. Ann. Mus. Civ. Stor. Nat. Genoa, 51, p. 207.
Kome Island, Lake Victoria Nyanza.

The genus *Pelomys* was formerly associated with the Indian *Golunda*, but it appears to be very much more closely related to *Arvicanthis*. *Mylomys* stands nearer *Golunda*, and is probably the African representative of it, but is less specialized dentally.

Genus 28. LEMNISCOMYS, Trouessart

1881. LEMNISCOMYS, Trouessart, Cat. Mamm. Viv. et Foss. Rodentia, Bull. Soc. Études Sci. D'Angers, X, 2e fasc., p. 124.

TYPE SPECIES.—*Mus barbarus*, Linnaeus.

RANGE.—Africa, including Palaearctic north-western portion: Morocco; Sahara (Asben), Sudan, Abyssinia, Kenya, Uganda, Tanganyika; Gambia, Sierra Leone, Nigeria, Congo, Angola, Mozambique, South-west Africa, and South Africa.

NUMBER OF FORMS.—Thirty-five.

CHARACTERS.—Closely allied to *Arvicanthis*, but fifth digit of manus so shortened that the manus appears to have three functional digits only. Skull of *Arvicanthis* type. The anterior zygomatic plate is usually rather lower, about half height muzzle; sometimes slightly concave anteriorly. It is, however, less low than in *Lophuromys*. Teeth sometimes less heavy than in *Arvicanthis*. *L. griselda* appears dentally to be near *Arvicanthis*; the outer row, particularly T.9 in M.1 and M.2 strongly reduced, the centre row of cusps very large; M.1 with eight cusps, M.2 with six; M.3 not highly abnormal (not, for instance, as in *Oenomys* or *Mylomys*). The teeth broad, and M.3 relatively large. Outside the *griselda* group, as a rule, the centre row is less enlarged, and the dentition is less extreme, and more normal; but some forms, as for instance *olga*, or *striatus venustus*, appear at any rate from the type skulls to be intermediate between the two types of dentition. The details of M.3 noted by Thomas when he separated this genus, and *Rhabdomys*, from *Arvicanthis*, do not appear to be of generic value.

Hindfoot rather narrow, the three centre digits with elongated appearance, the two outer digits strongly shortened, subequal in length. Forefoot with three main digits; D.5 without claw, and nearly suppressed. Fur usually rough; tail relatively well haired, and may be longer than head and body. Mammae 2—2=8 (*griselda* group) (Shortridge).

Three species groups may be recognized, as is well known; the *griselda* group, with a middorsal stripe only; the *barbarus* group, in which this persists, but the sides with many stripes present (and general colour most often less dark than in *striatus* group); and the *striatus* group, in which the body stripes are broken up into rows of spots.

Forms seen: *akka*, *ardens*, *barbarus*, *dunni*, *calidior*, *convictus*, *fasciatus*, *griselda*, *linulus*, *lynesi*, *macculus*, *massaicus*, *micropus*, *nigeriae*, *nubalis*, *olga*, *oweni*, *phaeotis*, *pulchellus*, *pulcher*, *rosalia*, *sabulata*, *spekei*, *striatus*, *venustus*, *wroughtoni*, *zebra*.

List of Named Forms

barbarus Group

1. LEMNISCOMYS BARBARUS BARBARUS, Linnaeus
1766. Syst. Nat. ed. 12, I, pt. 2, add. not paged.
Morocco.

2. LEMNISCOMYS BARBARUS IFNIENSIS, Agacino
1935. Bol. Real. Soc. Esp. Hist. Nat. 35, p. 390.
Ifni, S.-W. Morocco.

3. LEMNISCOMYS BARBARUS ZEBRA, Heuglin
1864. Nov. Act. Acad. Caes. Leop. 31, Abh. VII, p. 10.
Country of Req Negroes, Djur and Bongo, Sudan.

4. LEMNISCOMYS BARBARUS CONVICTUS, Osgood
1910. Field. Mus. Nat. Hist. Zool. ser. X, 2, p. 10.
Voi, Kenya.

5. LEMNISCOMYS BARBARUS ALBOLINEATUS, Osgood
1910. Field. Mus. Nat. Hist. Zool. ser. X, 2, p. 11.
Ulukenya Hills, Kenya.

6. LEMNISCOMYS BARBARUS MANTEUFELI, Matschie
1911. Sitz. Ber. Ges. Nat. Fr. Berlin, no 8, p. 338.
Mwanza, Tanganyika.

7. LEMNISCOMYS BARBARUS NIGERIAE, Thomas
1912. Ann. Mag. Nat. Hist. 8, IX, p. 272.
Panyam, N. Nigeria.

8. LEMNISCOMYS BARBARUS DUNNI, Thomas
1903. Proc. Zool. Soc. London, p. 297.
Kaga Hills, W. Kordofan, Sudan.

9. LEMNISCOMYS BARBARUS NUBALIS, Thomas & Hinton
1923. Proc. Zool. Soc. London, p. 267.
Talodi, S. Kordofan, Sudan.

10. LEMNISCOMYS BARBARUS OWENI, Thomas
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 120.
Gemenjulla, French Gambia.

11. LEMNISCOMYS BARBARUS ORIENTALIS, Hatt
1935. Amer. Mus. Nov. 790, p. 2.
Faradje, N.-E. Belgian Congo.

12. LEMNISCOMYS BARBARUS SPEKEI, de Winton
1897. Ann. Mag. Nat. Hist. 6, XX, p. 318.
Unyamuezi, Tanganyika.

13. LEMNISCOMYS OLGA, Thomas & Hinton
1921. Nov. Zool. XXVIII, p. 9.
Damergou, Air, W. Sahara.

striatus Group

14. LEMNISCOMYS STRIATUS STRIATUS, Linnaeus

1758. Syst. Nat. ed. 10, p. 62.
Sierra Leone.
Synonym: *orientalis*, Desmarest, Nouv. Dict. H. N., 2, 29, 59, 1819.

15. LEMNISCOMYS STRIATUS MASSAICUS, Pagenstecher

1884. Jahrb. Gamb. wiss. Anst. p. 45.
Lake Naivasha, Kenya.
Synonym: *pulchellus micropus*, Heller, 1911, Smiths. Misc. Coll. LVI, 17, p. 9. Rhino Camp, Lado.
pulchellus spermophilus, Heller, 1912, Smiths. Misc. Coll. LIX, 16, p. 11. Mt. Gargues, Kenya.

16. LEMNISCOMYS STRIATUS ARDENS, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 313.
Rombo, Kilimanjaro.

17. LEMNISCOMYS STRIATUS VENUSTUS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 461.
Panyam, N. Nigeria.

18. LEMNISCOMYS STRIATUS WROUGHTONI, Thomas

1910. Ann. Mag. Nat. Hist. 8, V, p. 85.
Nono, west of Addis Ababa, Abyssinia.

19. LEMNISCOMYS STRIATUS PULCHER, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 378.
Anambra Creek, S. Nigeria.

20. LEMNISCOMYS STRIATUS FASCIATUS, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 377.
Anambra Creek, S. Nigeria.

21. LEMNISCOMYS STRIATUS PULCHELLUS, Gray

1864. Proc. Zool. Soc. London, p. 57.
W. Africa.

22. LEMNISCOMYS STRIATUS LULUAE, Matschie

1926. Zeitschr. für Säugetierk. 1, p. 112.
Shibakala, near Luluabourg, S. Congo.

23. LEMNISCOMYS LYNESI, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 267.
Jebel Marra, Darfur.

griselda Group

24. LEMNISCOMYS GRISELDA GRISELDA, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIII, p. 414.
Jinga Country, N. Angola.

25. LEMNISCOMYS GRISELDA MEARNSI, Heller

1914. Smiths. Misc. Coll. LXIII, no. 7, p. 12.
Fort Hall, Kenya.

26. LEMNISCOMYS GRISELDA MACULOSUS, Osgood

1910. Field. Mus. Nat. Hist. Zool. ser. X, 3, p. 17.
Voi, Kenya.
Synonym: *griselda phaeotis*, Thomas, 1910, Ann. Mag. Nat. Hist. 8, VI, p. 429. Mazeras, coast of Kenya.

27. LEMNISCOMYS GRISELDA ROSALIA, Thomas
1904. Ann. Mag. Nat. Hist. 7, XIII, p. 414.
Monda, Nguru Mountains, Tanganyika.

28. LEMNISCOMYS GRISELDA LINULUS, Thomas
1910. Ann. Mag. Nat. Hist. 8, VI, p. 429.
Gamon, French Gambia.

29. LEMNISCOMYS GRISELDA CALIDIOR, Thomas & Wroughton
1908. Proc. Zool. Soc. London, p. 545.
Tambarara, Gorongoza Mountains, Portuguese E. Africa.

30. LEMNISCOMYS GRISELDA SABULATA, Thomas
1927. Proc. Zool. Soc. London, p. 385.
Sandfontein, E. Damaraland, S.-W. Africa.

31. LEMNISCOMYS GRISELDA FITZSIMONSI, Roberts
1932. Ann. Transv. Mus. XV, p. 11.
Kaotwe Pan, Central Kalahari.

32. LEMNISCOMYS GRISELDA SPINALIS, Thomas
1916. Ann. Mag. Nat. Hist. 8, XVIII, p. 69.
South Africa, assumed to be W. Transvaal.
Synonym: *dorsalis*, Smith, 1845, Ill. S. Afr. Zool. pl. 46, fig. 2; preoccupied.

33. LEMNISCOMYS GRISELDA ZULUENSIS, Roberts
1931. Ann. Transv. Mus. XIV, p. 235.
Manaba, N. Zululand.

34. LEMNISCOMYS MACCULUS MACCULUS, Thomas & Wroughton
1910. Trans. Zool. Soc. London, XIX, p. 515.
Moki, S.-E. Ruwenzori.

35. LEMNISCOMYS MACCULUS AKKA, Thomas
1915. Ann. Mag. Nat. Hist. 8, XVI, p. 479.
Tingasi, Monbuttu, N.-E. Congo.

Genus 29. RHABDOMYS, Thomas

1916. Rhabdomys, Thomas, Ann. Mag. Nat. Hist. 8, XVIII, p. 69.

Type Species.—*Mus pumilio*, Sparrmann.

Range.—African: Kenya, Angola, Rhodesia, Nyasaland, South-west Africa, Kalahari, and South Africa generally.

Number of Forms.—Fourteen.

Characters.—Skull not unlike that of a small *Arvicanthis*. Rostrum shortened, to a degree; supraorbital ridges usually present; zygomatic plate cut back anteriorly, higher than in *Lemniscomys*; bullae relatively large; palatal foramina long. Molars moderately heavy, more so than is normal in *Rattus*, rather lighter as a rule than *Arvicanthis* and *Aethomys*; the pattern seems not to wear down until rather late in life; the centre row of cusps tending to be large; T.9 rather reduced in M.1 and M.2. M.3 smaller than M.2, but not strongly reduced. Lower teeth with the terminal heel of M.1 and M.2 rather reduced.

Back with three light lines bordered by four dark ones. D.5 of forefoot reduced, but not vestigial. Hindfoot with the three centre digits moderate, and D.5 and the hallux rather strongly reduced; D.5 little longer than hallux, and scarcely reaching past base of D.4 as a rule. Fur rather rough. Tail relatively well haired, subequal in length to head and body as a rule. Mammae 2—2=8 (Shortridge).

Forms seen: *angolae*, *bechuanae*, *chakae*, *cinereus*, *diminutus*, *dilectus*, *griquae*, *intermedius*, *moshesh*, *meridionalis*, *nyasae*, *pumilio*.

List of Named Forms

1. RHABDOMYS PUMILIO PUMILIO, Sparrmann

1784. Vet. Akad. Handl. V, p. 236.
Sitzicamma Forest, on Snake River, east Cape of Good Hope. (See G. M. Allen, 1939.)
Synonym: *donavani*, Lesson, Man. Mamm. p. 268, 1827.
major, Brants, Geslacht der Muizen, 105, 1827.
lineatus, Cuvier, Hist. Nat. Mamm. pl. 161, 1829.
septemvittatus, Schinz, Syst. Verz. Säug. 2, 155, 1845.
vittatus, Wagner, 1842, Arch. Nat. VIII, p. 11.

2. RHABDOMYS PUMILIO MERIDIONALIS, Wroughton

1905. Ann. Mag. Nat. Hist. 7, XVI, p. 632.
Tokai Retreat, Cape Town.

3. RHABDOMYS PUMILIO MOSHESH, Wroughton

1905. Ann. Mag. Nat. Hist. 7, XVI, p. 638.
Maseru, Basutoland, S. Africa.

4. RHABDOMYS PUMILIO CHAKAE, Wroughton

1905. Ann. Mag. Nat. Hist. 7, XVI, p. 636.
Sibudeni, Zululand.

5. RHABDOMYS PUMILIO INTERMEDIUS, Wroughton

1905. Ann. Mag. Nat. Hist. 7, XVI, p. 635.
Deelfontein, Cape Colony.

6. RHABDOMYS PUMILIO CINEREUS, Thomas & Schwann

1904. Abstr. Proc. Zool. Soc. London, 2, p. 5; Proc. Zool. Soc. London, p. 179.
Klipfontein, Little Namaqualand.

7. RHABDOMYS PUMILIO GRIQUAE, Wroughton

1905. Ann. Mag. Nat. Hist. 7, XVI, p. 632.
Kuruman, Bechuanaland.

8. RHABDOMYS PUMILIO BECHUANAE, Thomas

1892. Proc. Zool. Soc. London, p. 551.
Rooibank, near Walvis Bay, S.-W. Africa.

9. RHABDOMYS PUMILIO DESERTI, Dollman

1910. Ann. Mag. Nat. Hist. 8, VI, p. 399.
Lehuititung, Kalahari.
(A synonym of *griquae* according to G. M. Allen.)

10. RHABDOMYS PUMILIO NAMIBENSIS, Roberts

1926. Ann. Transv. Mus. XI, p. 255.
Swakopmund, S.-W. Africa.

11. RHABDOMYS PUMILIO NYASAE, Wroughton

1905. Ann. Mag. Nat. Hist. 7, XVI, p. 639.
Mlanji Plateau, Nyasaland.

12. RHABDOMYS PUMILIO DILECTUS, de Winton

1896. Proc. Zool. Soc. London, p. 803.
Mazoe, Mashonaland.

13. RHABDOMYS PUMILIO ANGOLAE, Wroughton

1905. Ann. Mag. Nat. Hist. 7, XVI, p. 636.
Caconda, N. Angola.

14. RHABDOMYS PUMILIO DIMINUTUS, Thomas

1892. Proc. Zool. Soc. London, p. 551.
Mianzini, Masai, Kenya.

The genus is distinguishable from *Lemniscomys* by its functional fifth finger, and from *Arvicanthis* by its smaller M.3 and much lighter teeth; but from *Rattus* and its subsidiary genera this genus is not clearly marked. The two posterior plantar pads appear to be becoming reduced; in five spirit specimens seen, one had only 5 plantar pads to the hindfoot; the sixth pad in the remainder was extremely small.

It is probably most closely allied to *Lemniscomys.*

Genus 30. HYBOMYS, Thomas

1910. Hybomys, Thomas, Ann. Mag. Nat. Hist. 8, V, p. 85.
1911. Typomys, Thomas, Ann. Mag. Nat. Hist. 8, VII, p. 382. (*Mus trivirgatus*, Temminck.)

Type Species.—*Mus univittatus*, Peters.

Range.—African: Ruwenzori, Cameroons, Gold Coast, Nigeria, Liberia.

Number of Forms.—Six.

Characters.—Skull short, broad, with not much interorbital constriction (least interorbital constriction on average about 18 per cent of occipitonasal length); infraorbital foramen relatively large; zygoma narrow. Nasals usually projecting somewhat anteriorly over the incisors. Supraorbital ridges moderately marked; rostrum broad, relatively long. Palatal foramina moderate or rather short. M.1 four-rooted. Bullae moderate. Molars rather broad; dentition not extreme, but cusps well marked; centre row of cusps of upper molars relatively large; T.6 usually joined to T.9 in M.1 and M.2; M.3 little reduced. Lower teeth complex, with well-marked cusps, and the outer subsidiary row strong. The molars of *H. trivirgatus* (type of genus *Typomys* of Thomas) are more extreme, heavier, with the cusps more raised up, the valleys between the rows more noticeable, and M.3 rather smaller; but the race *pearcei* appears to be intermediate between the two types, so that it is not possible to say which the molars of this race come nearest to; Thomas compared the dentition of typical *trivirgatus* to that of *Mylomys*, but I am convinced it has nothing to do with that genus, being very much less extreme in all points, and with M.3 quite normal instead of with the highly aberrant pattern characteristic of *Mylomys*. *H. trivirgatus* also has the skull a little more extreme than in *univittatus*, with zygomatic plate sloping backwards as a rule, shorter palatal foramina, rather broader interorbital region.

In *univittatus*, usually a black middorsal stripe is present, but this can be obsolete. In *planifrons*, there is also a middorsal; in *trivirgatus*, there are three black stripes on the back. Hindfoot narrow, with D.5 much reduced, scarcely longer than the hallux; D.5 of forefoot moderate; tail not well haired. Mammae 1—2—6 or 0—2—4 (according to Thomas, either formula may be present in *univittatus*). Ingoldby (1929, Ann. Mag. Nat. Hist. 10, III, p. 522) considers *Typomys* a synonym of *Hybomys*, and in this he has been followed by Hayman. I am in agreement with this classification; far too many essential points are shared by the two specific groups.

Forms seen: *lunaris*, *pearcei*, *planifrons*, *trivirgatus*, *univittatus*.

List of Named Forms

univittatus Group

1. HYBOMYS UNIVITTATUS UNIVITTATUS, Peters

1876. Monatsb. K. Akad. Wiss. Berlin, p. 479.
Dongila, Gaboon.
Synonym: *rufocanus*, Tullberg, Nova Acta Reg. Soc. Sci. Upsala, 3, 16, no. 12, p. 23, 1893.

2. HYBOMYS UNIVITTATUS LUNARIS, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 145.
E. Ruwenzori, Uganda.

3. HYBOMYS UNIVITTATUS BADIUS, Osgood

1936. Field Mus. Pub. Zool. ser. XX, p. 254.
South-west slope of Mount Cameroon, Cameroon Mandate, British Nigeria.

4. HYBOMYS UNIVITTATUS PLANIFRONS, Miller

1900. Proc. Acad. Sci. Washington, II, p. 641.
Mount Coffee, Liberia.

trivirgatus Group

5. HYBOMYS TRIVIRGATUS TRIVIRGATUS, Temminck

1853. Esq. Zool. Côte de Guiné, p. 159.
Dabocrom, Gold Coast.

6. HYBOMYS TRIVIRGATUS PEARCEI, Ingoldby
1929. Ann. Mag. Nat. Hist. 10, III, p. 522.
Lagos, Nigeria.

The form *planifrons* is listed by G. M. Allen as a race of *univittatus*, though it was formerly classed as "*Typomys*." No skulls have been examined.

Genus 31. MILLARDIA, Thomas

1911. MILLARDIA, Thomas, Journ. Bombay Nat. Hist. Soc. XX, p. 998.
1917. GUYIA, Thomas, Journ. Bombay Nat. Hist. Soc. XXV, p. 201. (*Millardia kathleenae*, Thomas.)
1911. GRYPOMYS, Thomas, Journ. Bombay Nat. Hist. Soc. XX, p. 999. (*Mus gleadowi*, Murray.)

TYPE SPECIES.—*Golunda meltada*, Gray.

RANGE.—India: Punjab and Sind south to Ceylon; Burma.

NUMBER OF FORMS.—Six.

CHARACTERS.—Skull with considerable interorbital constriction, and well-marked supraorbital ridges. Rostrum moderate, not shortened. Zygomatic plate cut back above. Palate normal (except in *gleadowi*), palatal foramina very long, extending between front molars. Bullae large.

Dentition in the young extremely heavy, and at all times strongly cuspidate; centre row of upper molars enlarged; inner row strong. In M.1 there is a tendency, most marked in *kathleenae* and *gleadowi*, for the anterointernal cusp to be distorted inwards, as in *Mus*; but M.3 is not much reduced, little smaller than M.2, and the toothrow has none of the *Mus* specialization. M.1 has all cusps except T.7; M.2 has all cusps except T.2 and T.7; in this tooth, T.9 and T.3 are reduced. Lower teeth with cusps strong, well developed.

Fur soft. Ear rather large. Tail subequal in length to head and body, relatively well haired. Hindfoot with plantar pads reduced to five or four, the fifth digit strongly shortened. D.5 manus medium.

Three well-marked species are known, each of which has received a generic name. There seems not the slightest need to divide them generically. Their characters are as follows:

M. gleadowi (which is the most extreme) has the posterior nares narrowed, the palate extending rather behind M.3, the effect as in *Pyromys*, also about as in *Mus tenellus*.

(The palate of *gleadowi* compares with *meltada* much as the palate of *Mus tenellus* compares with any of the normal small species of *Mus* from Africa, such as *bellus*.)

Mammae 1—2=6. Small, 97 mm. or slightly less, head and body. Sind and Cutch.

M. kathleenae. Posterior palate normal. Mammae 0—2=4. Larger than *gleadowi*; about 129–157 mm. Burma.

M. meltada. Posterior palate normal. Mammae 2—2 = 8. Head and body about 107–156 mm. Ceylon, Peninsular India, north to Punjab.

Forms seen: *coomberi*, *dunni*, *gleadowi*, *kathleenae*, *listoni*, *meltada*, *pallidior*.

List of Named Forms

meltada Group

1. MILLARDIA MELTADA MELTADA, Gray

1837. Ann. Mag. Nat. Hist. 1, p. 586.
Dharwar, S. Mahratta, India.
Synonym: *comberi*, Wroughton, 1907, Journ. Bombay Nat. Hist. Soc. XVII, p. 999. Nasik, Bombay.

2. MILLARDIA MELTADA DUNNI, Thomas

1917. Journ. Bombay Nat. Hist. Soc. XXV, p. 202.
Handiserah, Amballa, Punjab.

3. MILLARDIA MELTADA PALLIDIOR, Ryley

1914. Journ. Bombay Nat. Hist. Soc. XXII, p. 659.
Lunza, Palanpur, Gujerat, W. India.

4. MILLARDIA MELTADA LISTONI, Wroughton

1907. Journ. Bombay Nat. Hist. Soc. XVII, p. 998.
Konkan, W. India.

kathleenae Group

5. MILLARDIA KATHLEENAE, Thomas

1914. Journ. Bombay Nat. Hist. Soc. XXIII, p. 29.
Pagan, Burma.

gleadowi Group

6. MILLARDIA GLEADOWI, Murray

1885. Proc. Zool. Soc. London, p. 809.
Karachi, Sind, W. India.

Genus 32. PYROMYS, Thomas

1911. Pyromys, Thomas, Journ. Bombay Nat. Hist. Soc. XX, p. 996.

Type Species.—*Pyromys priestleyi*, Thomas.

Range.—Sind (India).

Number of Forms.—One.

Characters.—Cranially and dentally not distinguishable from *Millardia gleadowi*. External characters very different; form slender, ear short, fur more or less spiny, hindfoot strongly shortened, plantar pads not reduced, D.5 not shortened. Tail well haired. Mammae 4—2 = 12.

The measurement of the type specimen, which is the only specimen represented in London, compares with a large specimen of *gleadowi* as follows:

Pyromys: head and body, 98; hindfoot, 16; ear, 13.
M. gleadowi: head and body, 97; hindfoot, 20; ear, 20·5.

It will be seen that the hindfoot is thus only about 16 per cent of the head and body length, which is much shorter than is usual in *Rattus*. The mammary formula suggests *Mus* (subgenus *Leggadilla*), but M.3 is much too complex and not reduced, though M.1, as is usual with these small Indian genera, suggests the *Mus* type. The posterior nares are much narrowed.

It is to be hoped that more specimens of this mouse will come to hand.

The status of the genus at present is by no means clear.

Forms seen: *priestleyi.*

List of Named Forms

1. PYROMYS PRIESTLEYI, Thomas
1911. Journ. Bombay Nat. Hist. Soc. XX, p. 996.
Virawar, Thar and Parkar, S. Sind.

Genus 33. DACNOMYS, Thomas

1916. Dacnomys, Thomas, Journ. Bombay Nat. Hist. Soc. XXIV, p. 404.

Type Species.—*Dacnomys millardi*, Thomas.

Range.—Eastern Himalayas: Sikkim, Assam, Laos.

Number of Forms.—Three.

Characters.—Like a large *Rattus*, but with very heavy teeth, and with a longer toothrow. Skull with prominent supraorbital ridges. Incisive foramina very broad, narrowed anteriorly and posteriorly, and approaching toothrows. Bullae very small. Zygomatic plate more or less straight anteriorly. Infraorbital foramen well open.

Cheekteeth with M.3 little reduced (though smaller than M.2), and three laminae clearly traceable; all the usual cusps present; a tendency in the second lamina of M.1 and M.2 for the cusps to form very sharp angles with their neighbours; general effect rather complex, and like *Rattus macleari*. Postero-internal cusp absent. Lower teeth heavy, the small accessory outer cusps present, and well-developed terminal heel. The toothrow is longer than in any species of *Rattus* measured (members of all the leading groups of that genus have been measured); the percentage against the condylobasal is 23 per cent to 21·8 per cent, as against 21·4 of the highest *Rattus* (*R. velutinus*, Australian). This, combined with the minute bullae and general complexity of the teeth, seems to make it quite clear that this is a valid genus, as all *Rattus* with bullae extremely reduced tend to have simple teeth. But it is not a well-known genus, and very few specimens are available for examination.

Size large, up to 290 head and body. No special external peculiarities; fur rather coarse; feet normal; tail rather longer than head and body. Mammae 2—2=8. The bullae are about 11–12 per cent of the occipitonasal length.

Forms seen: *millardi*, *wroughtoni*.

List of Named Forms

1. DACNOMYS MILLARDI MILLARDI, Thomas

1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 405.
Gopaldhara, near Darjeeling, Sikkim.

2. DACNOMYS MILLARDI INGENS, Osgood

1932. Field, Mus. Nat. Hist. Zool. ser. XVIII, p. 315.
Phong Saly, Laos.

3. DACNOMYS MILLARDI WROUGHTONI, Thomas

1922. Journ. Bombay Nat. Hist. Soc. XXVIII, p. 430.
Dreyi, Mishmi Hills, Assam.

Genus 34. EROPEPLUS, Miller & Hollister

1921. Eropeplus, Miller & Hollister, Proc. Biol. Soc. Washington, XXXIV, p. 94.

Type Species.—*Eropeplus canus*, Miller & Hollister.

Range.—Celebes.

Number of Forms.—One.

Characters.—Very near *Rattus*, and doubtfully distinguishable from it, but with a relatively longer toothrow than is normal in that genus, so far as at present known.

This genus was unrepresented at the British Museum when this work was started, but two specimens have come to hand from the Frost collection, both females, from Rantekaroa, Quarles Mountains, Middle Celebes, 6,000 ft.

Skull with rather heavy long rostrum, and considerable interorbital constriction; supraorbital ridges well developed, and extending back over braincase. Zygomatic plate very slightly cut back above. Palate strongly narrowed. Palatal foramina relatively long. Bullae moderate in size. Molars in one specimen (the other worn out) evidently not unlike those of *Rattus*; T.1 in M.2 and M.1 relatively large; M.3 not much reduced. Toothrow large and heavy, but in the worn specimens not particularly hypsodont as suggested by the describers. Lower molars probably originally with a large terminal heel in M.1 and M.2.

Externally, largish, very soft-furred; tail long, moderately haired, feet not abnormal.

Cranial measurements of the specimens:

OCCIPITONASAL	CONDYLOBASAL	TOOTHROW	BULLAE	LEAST PALATE	LEAST INTERORBITAL
48·4	46	9·8	8	3·2	6·7
48	45	9·8	7·8	3·3	6·2

Head and body	230	230
Tail	265	290
Hindfoot	40	45
Ear	30	30

These specimens appear larger than Miller & Hollister's (195 head and body), and with a proportionately shorter toothrow (toothrow 10, condylobasal 44, from description of type), and probably represent a new subspecies.

Forms seen: *canus*.

List of Named Forms

1. EROPEPLUS CANUS, Miller & Hollister

1921. Proc. Biol. Soc. Washington, XXXIV, p. 95.
Goenoeng Lehio, S.-W. of Lake Lindoe, Middle Celebes.

The "hypsodont" character of the cheekteeth having broken down, this genus is at present retainable on length of toothrow, compared with *Rattus*. Even here there is a slight overlapping, a specimen of *Rattus velutinus* from Australia giving a percentage of 21·4 of toothrow against condylobasal, against the measurements 21·7, 21·3, and 22·7 available for this genus. However, it is so very uncommon that this percentage is approached within *Rattus*, including all leading species throughout the Old World, that until it is proved to the contrary it may be assumed that *Eropeplus* may stand on having this character developed, and normally exceeding any *Rattus*. (Of eighty-five species of *Rattus* measured in this character, only four are over 20 per cent on this measurement, and all except the one mentioned above are under 21 per cent.)

Genus 35. STENOCEPHALEMYS, Frick

1914. Stenocephalemys, Frick, Ann. Carnegie Mus. IX, p. 7.

Type Species.—*Stenocephalemys albocaudata*, Frick.

Range.—Mountains of South Abyssinia.

Number of Forms.—One.

Characters.—Skull with abrupt and extreme interorbital constriction (about 12 per cent of occipitonasal length), this placed posteriorly so that the braincase appears much shortened. Rostrum long, heavy. Infraorbital foramen relatively large; zygomatic plate with anterior border cut back above. Palatal foramina long, reaching toothrow. Upper molars like those of *Dacnomys* or a complex-toothed *Rattus*, the cusps well marked and angular, the folds between the cusps on each lamina well marked, the outer row not reduced, T.9 strong, projecting outwards, in M.1 and M.2; M.3 smaller than M.2.

Fur extremely thick and soft. Tail about head and body length, well haired; feet normal.

The strongly constricted frontals apparently will distinguish this genus sufficiently from *Rattus*; normally no *Rattus* gives as low a percentage as this, though in old age individuals might do so, in some cases (no specimen actually measured does so).

Forms seen: *albocaudata*.

List of Named Forms

1. STENOCEPHALEMYS ALBOCAUDATA, Frick

1914. Ann. Carnegie Mus. IX, p. 8.
Inyala Camp, Chilalo Mountains, S. Abyssinia.

Genus 36. AETHOMYS, Thomas

1915. Aethomys, Thomas, Ann. Mag. Nat. Hist. 8, XVI, p. 477.

Type Species.—*Epimys hindei*, Thomas.

Range.—African: Sudan, Kenya, Uganda, Tanganyika; Nigeria; South Congo, Angola; Rhodesia, Nyasaland, Mozambique, South-west Africa, Transvaal.

Number of Forms.—Thirty.

Characters.—As here understood, the genus is restricted to the species *kaiseri*, *chrysophilus*, *walambae*, and their immediate allies, and does not include the *namaquensis* group, which is fully discussed within the genus *Thallomys*, to which it is referred.

This genus is very difficult to classify, being one of the rather numerous African "borderline" genera, overlapping to a certain extent *Rattus* on the one hand, and *Arvicanthis* on the other. It makes the generic separation of *Arvicanthis* from *Rattus* somewhat doubtful.

Skull with well-marked supraorbital ridges; zygomatic plate strongly cut back, its anterior border with a tendency, which, however, is not constant, to be concave. Incisive foramina long, penetrating between molars. Bullae large to very large, about 17 to 21 per cent of occipitonasal length. Rostrum heavy, with rather broad nasals; normally longer than in *Arvicanthis*. Molars relatively broad, rather heavier and more angular than is usual in normal *Rattus* (though not more so than in all species), and distinctly reminiscent of *Arvicanthis*; M.3 is little reduced, and in some cases, particularly in worn specimens, tends to be as long as or longer than M.2, as in *Arvicanthis*. M.1 with all cusps except T.7 present. The centre row can become enlarged. The species *walambae* and *kaiseri* appear to have the least reduced M.3 as a rule; some races of *chrysophilus* are more normal in this respect, though others are as *walambae*. Lower molars with no special peculiarities, as a rule.

Fur often rather soft. Hindfoot with the outer digits strongly reduced, in *kaiseri* and *walambae* with D.5 scarcely longer than hallux, and barely reaching base of D.4; three centre digits not appearing lengthened as a rule; D.5 forefoot moderate. *A. chrysophilus* also has the fifth digit of the hindfoot shortened, though in some cases rather less so than in *kaiseri* group; but taking its molars into account, and also that the digit reduction is very general, it seems best to refer it to this genus. In St. Leger's key, *Aethomys* is placed among the *Rattus* Rats, which have the digits less reduced than in the *Arvicanthis* group; but I am not able to distinguish *Aethomys* from *Arvicanthis* on this character. In fact, apart from the rostrum being on average longer, and the molars a little less extreme, there is little to separate it from that genus; while the *namaquensis* group, formerly referred to this genus (but with a more or less arboreal foot, with D.5 long, and M.3 constantly smaller than M.2, so far as seen), connects it closely with *Rattus*.

Forms seen: *acticola*, *algazel*, *amalae*, *avarillus*, *bocagei*, *chrysophilus*, *hindei*, *hintoni*, *imago*, *ineptus*, *kaiseri*, *medicatus*, *manteufeli*, *nyikae*, *norae*, *pedester*, *stannarius*, *singidae*, *thomasi*, *tzaneenensis*, *voi*, *walambae*.

In *walambae*, the tail is shorter than the head and body; in *kaiseri* and *chrysophilus* it is subequal or may be rather longer.

List of Named Forms

1. AETHOMYS KAISERI KAISERI, Noack
1887. Zool. Jahrb. Syst. II, p. 228, pl. ix, figs. 1–3.
Marungu, E. Congo.

2. AETHOMYS KAISERI TURNERI, Heller
1914. Smiths. Misc. Coll. LXIII, no. 7, p. 8.
Kisumu, Kenya.

3. AETHOMYS KAISERI MEDICATUS, Wroughton
1909. Ann Mag. Nat. Hist. 8, IV, p. 540.
Mumias, Kenya.

4. AETHOMYS KAISERI NORAE, Wroughton
1909. Ann. Mag. Nat. Hist. 8, IV, p. 541.
Guaso Narok, Upper Guaso Nyiro, Kenya.

5. AETHOMYS KAISERI HINDEI, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 218.
Machakos, Kenya.

6. AETHOMYS KAISERI HELLERI, Hollister
1918. Proc. Biol. Soc. Washington, XXXI, p. 97.
Lado Enclave, Rhino Camp.
Synonym: *centralis*, Heller, 1914, Smiths. Misc. Coll. LXIII, 7, p. 10.
Preoccupied. Not of Schwann.

7. AETHOMYS KAISERI MANTEUFELI, Matschie
1911. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 341.
Mwanza, Lake Victoria, Tanganyika.

8. AETHOMYS KAISERI ALGAZEL, Wroughton
1907. Ann. Mag. Nat. Hist. 7, XX, p. 501.
Bahr-el-Ghazal, Sudan.

9. AETHOMYS BOCAGEI, Thomas
1904. Ann. Mag. Nat. Hist. 7, XIII, p. 416.
Pungo Andongo, N. Angola.

10. AETHOMYS WALAMBAE WALAMBAE, Wroughton
1907. Mem. Manchester Phil. & Lit. Soc. 5, p. 21.
Msofu River, N. Rhodesia.

11. AETHOMYS WALAMBAE AMALAE, Dollman
1914. Abstr. Proc. Zool. Soc. London, p. 25; Proc. Zool. Soc. London, p. 313.
Near Amala River, Kenya.

12. AETHOMYS WALAMBAE PEDESTER, Thomas
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 376.
Kigezi, S.-W. Uganda.

13. AETHOMYS WALAMBAE HINTONI, Hatt
1934. Amer. Mus. Nov. 708, p. 7.
Kambove, Katanga, S. Congo.

14. AETHOMYS THOMASI, de Winton
1897. Ann. Mag. Nat. Hist. 6, XX, p. 321.
Galanga, Angola.

15. AETHOMYS CHRYSOPHILUS CHRYSOPHILUS, de Winton
1896. Proc. Zool. Soc. London, p. 801.
Mazoe, Mashonaland.

16. AETHOMYS CHRYSOPHILUS VOI, Osgood
1910. Field Mus. Nat. Hist. Zool. ser. X, 2, p. 11.
Voi, Kenya.

17. AETHOMYS CHRYSOPHILUS SINGIDAE, Kershaw
1923. Ann. Mag. Nat. Hist. 9, XII, p. 535.
Singida, Kilosa, Tanganyika.

18. AETHOMYS CHRYSOPHILUS DOLLMANI, Hatt
1934. Amer. Mus. Nov. 708, p. 8.
Katanga, S. Congo.

19. AETHOMYS CHRYSOPHILUS AVARILLUS, Thomas & Wroughton
1908. Proc. Zool. Soc. London, p. 547.
Tette, Portuguese Zambezia.

20. AETHOMYS CHRYSOPHILUS INEPTUS, Thomas & Wroughton
1908. Proc. Zool. Soc. London, p. 546.
Tette, Portuguese Zambezia.

21. AETHOMYS CHRYSOPHILUS NYIKAE, Thomas
1897. Proc. Zool. Soc. London, p. 431.
Nyika Plateau, N. Nyasa.

22. AETHOMYS CHRYSOPHILUS ACTICOLA, Thomas & Wroughton
1908. Proc. Zool. Soc. London, p. 547.
Beira, Portuguese E. Africa.

23. AETHOMYS CHRYSOPHILUS IMAGO, Thomas
1927. Proc. Zool. Soc. London, p. 387.
Stampriet, S.-W. Africa.

24. AETHOMYS CHRYSOPHILUS TONGENSIS, Roberts
1931. Ann. Trans. Mus. XIV, p. 235.
Mangusi Forest, N. Zululand.

25. AETHOMYS CHRYSOPHILUS TZANEENENSIS, Jameson
1909. Ann. Mag. Nat. Hist. 8, IV, p. 460.
Tzaneen, Zoutspansberg district, Transvaal.

26. AETHOMYS CHRYSOPHILUS PRETORIAE, Roberts
1913. Ann. Transv. Mus. IV, p. 85.
Pretoria, Transvaal.

27. AETHOMYS CHRYSOPHILUS MAGALAKUINI, Roberts

1926. Ann. Transv. Mus. XI, p. 254.
Wilhanshohe, Magalakuin, Transvaal.

28. AETHOMYS CHRYSOPHILUS CAPRICORNIS, Roberts

1926. Ann. Transv. Mus. XI, p. 254.
Zoutspansberg, Transvaal.

29. AETHOMYS CHRYSOPHILUS ALBIVENTER, Jentink

1909. Beitr. Kentn. Faun. S. Afr. p. 246.
Mossel Bay, Cape Colony.

30. AETHOMYS STANNARIUS, Thomas

1913. Ann. Mag. Nat. Hist. 8, XI, p. 482.
Kabwir, Bauchi Province, N. Nigeria.

Genus 37. THALLOMYS, Thomas

1920. THALLOMYS, Thomas, Ann. Mag. Nat. Hist. 9, V, p. 141.

TYPE SPECIES.—*Mus nigricauda*, Thomas.

RANGE.—African: Kenya, Angola, Rhodesia, South-west Africa, Bechuanaland, Transvaal, South Africa.

NUMBER OF FORMS.—Thirty, as here understood.

CHARACTERS.—(The genus is very doubtfully distinct from *Rattus*.) Molars more complex and angular than is usual in *Rattus*. Skull with considerable interorbital constriction, moderately marked supraorbital ridges as a rule. Zygomatic plate with anterior border cut back above. Bullae relatively large, in the typical group usually about 20 per cent or more of occipitonasal length. Palatal foramina long, usually penetrating between toothrows. Molars complex, angular; the centre row of the upper molars enlarged to a degree; M.1 with eight cusps, M.2 with seven. M.1 is five-rooted in the typical group. M.3 smaller than M.2, but not much reduced. Lower molars with very prominent cusps, and the terminal heel of M.1 and M.2 is almost obliterated. It was on this account (as well as on the external specializations towards arboreal life, which do not distinguish it from several forms of *Rattus*) that the group was primarily given generic rank by Thomas, the lower molars being described as "cusps high, very sharply defined, their wearing surfaces pointed forwards, and the median valley along the toothrow sharp and deep; almost no trace of median supplementary cusps." Whether this distinguishes the genus from all forms of *Rattus* is a matter of doubt, and the genus has been retained mostly for convenience. The molars of "*Aethomys*" *namaquensis* are certainly not distinguishable from typical *Thallomys*, and, as discussed below, this group is here referred to the genus.

Fur soft. Feet short, the hindfoot relatively broad (but not more proportionately shortened nor broadened than in some species of *Rattus*), toes rather short; D.5 lengthened. A similar type of foot (if a little less shortened) appears in the *Rattus cremoriventer* group. Tail longer than head and body as a rule, relatively well haired. Mammae "0—2=4" (Thomas), "normal number is 6 (1—2=6)" (Shortridge).

T. namaquensis group. This group was referred to *Aethomys* by Thomas, after originally being placed in *Praomys*. The molars are too heavy for *Praomys* (=*Rattus*), being, like *Aethomys*, well cusped and relatively heavy. But M.3 appears constantly smaller than M.2, which is not always the case in *Aethomys*; the supraorbital ridges appear lighter; and furthermore, the feet show none of the digit reduction common in *Aethomys*, and the foot is more or less of arboreal type, with relatively long D.5. The tail is as a rule considerably longer than head and body, quite well haired; the size is moderate (head and body usually under 130); the mammary formula is 1—2=6. There is a note in Shortridge's book on South-west African mammals to the effect that Roberts suggests that the group is not to be referred to *Aethomys*; I have worked through these African Rats and have come twice to the same conclusion. The molars being too heavy for *Praomys*, it is here referred to *Thallomys*, with which it agrees in mammary formula, and differs in the slightly less arboreal hindfoot.

Typical *Thallomys* is as a rule rather larger than the *namaquensis* group (up to about 160 mm. head and body).

All these African Rats are closely allied, their relationships frequently being hidden under a bewildering number of generic names which are for the most part little more than well-marked specific groups of *Rattus*. The *namaquensis* group closely connects *Thallomys*, *Aethomys*, and *Praomys* with *Rattus*, and with each other.

Forms seen: *auricomis*, *arborarius*, *calarius*, *centralis*, *damarensis*, *herero*, *kalaharicus*, *lehocla*, *leuconoe*, *loringi*, *monticolaris*, *namaquensis*, *nigricauda*, *nitela*, *paedulcus*, *rhodesiae*, *shortridgei*, *siccatus*.

List of Named Forms

nigricauda Group

1. THALLOMYS NIGRICAUDA NIGRICAUDA, Thomas

1882. Proc. Zool. Soc. London, p. 266.
Hountop River, Great Namaqualand, S.-W. Africa.

2. THALLOMYS NIGRICAUDA LORINGI, Heller

1909. Smiths. Misc. Coll. LII, p. 471.
Lake Naivasha, Kenya.

3. THALLOMYS NIGRICAUDA KALAHARICUS, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 544.
Molopo River, Bechuanaland.

4. THALLOMYS NIGRICAUDA LEUCONOE, Thomas

1926. Proc. Zool. Soc. London, p. 303.
Osohama, Etosha Pan, Ovamboland, S.-W. Africa.

5. THALLOMYS NIGRICAUDA BRADFIELDI, Roberts

1933. Ann. Transv. Mus. XV, p. 268.
Okahandja, S.-W. Africa.

6. THALLOMYS NIGRICAUDA MOLOPENSIS, Roberts

1933. Ann. Transv. Mus. XV, p. 269.
Pitsani Junction, between Setlagoli and Molopo Rivers, Bechuanaland.

7. THALLOMYS NIGRICAUDA SHORTRIDGEI, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 492.
Louisvale, Middle Orange River.

8. THALLOMYS NIGRICAUDA NITELA, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 493.
Bombone, Mossamedes, Angola.

9. THALLOMYS DAMARENSIS DAMARENSIS, de Winton

1897. Ann. Mag. Nat. Hist. 6, XIX, p. 349.
Damaraland.

10. THALLOMYS DAMARENSIS RHODESIAE, Osgood

1910. Ann. Mag. Nat. Hist. 8, V, p. 277.
East Loangwa district, Petauke, N. Rhodesia.

11. THALLOMYS DAMARENSIS HERERO, Thomas

1926. Proc. Zool. Soc. London, p. 303.
Ondongwa, Ovamboland, S.-W. Africa.

12. THALLOMYS DAMARENSIS STEVENSONI, Roberts

1933. Ann. Transv. Mus. XV, p. 269.
Bembesi, 30 miles north of Bulawayo.

13. THALLOMYS DAMARENSIS SCOTTI, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 493.
Yata Plains, between Thika and Tana Rivers, Kenya.

14. THALLOMYS MOGGI MOGGI, Roberts

1913. Ann. Transv. Mus. IV, p. 85.
Zoutpan, Pretoria district, S. Africa.

15. THALLOMYS MOGGI ACACIAE, Roberts

1915. Ann. Transv. Mus. V, p. 120.
Woodbush, Transvaal.

16. THALLOMYS MOGGI LEBOMBOENSIS, Roberts

1931. Ann. Transv. Mus. XIV, p. 234.
Mkuzi River, Ubombo, N. Zululand.

17. THALLOMYS PAEDULCUS, Sundevall

1846. K. Svenska Vet. Akad. Stockholm, p. 120.
Interior of Kaffirland.

namaquensis Group

18. THALLOMYS NAMAQUENSIS NAMAQUENSIS, Smith

1834. South Afr. Quart. Journ. II, p. 160.
Namaqualand.
Synonym: *fusca*, Cuvier, Hist. Nat. Mamm. pt. 61, 1829.

19. THALLOMYS NAMAQUENSIS AURICOMIS, de Winton

1896. Proc. Zool. Soc. London, p. 802.
Mazoe, Mashonaland.

20. THALLOMYS NAMAQUENSIS ARBORARIUS, Peters

1852. Reise n. Mossambique: Säugeth. p. 152, pls. 35, 36.
Tette, Portuguese E. Africa.

21. THALLOMYS NAMAQUENSIS SICCATUS, Thomas

1926. Proc. Zool. Soc. London, p. 304.
Cunene Falls, Ovamboland, S.-W. Africa.

22. THALLOMYS NAMAQUENSIS CALARIUS, Thomas

1926. Ann. Mag. Nat. Hist. 9, XVII, p. 184.
Lehutitung, Kalahari.

23. THALLOMYS NAMAQUENSIS LEHOCLA, Smith

1836. App. Rep. Explor. Exped. S. Afr. p. 43.
Latakoo, Bechuanaland.

24. THALLOMYS NAMAQUENSIS GRAHAMI, Roberts

1915. Ann. Transv. Mus. V, p. 118.
Grahamstown, S. Africa.

25. THALLOMYS NAMAQUENSIS MONTICULARIS, Jameson

1909. Ann. Mag. Nat. Hist. 8, IV, p. 461.
Johannesburg, Transvaal.

26. THALLOMYS NAMAQUENSIS LEHOCHLOIDES, Roberts

1926. Ann. Transv. Mus. XI, p. 255.
Magalakuin, Transvaal.

27. THALLOMYS NAMAQUENSIS CAPENSIS, Roberts

1926. Ann. Transv. Mus. XI, p. 254.
Paarl, Cape Colony.

28. THALLOMYS NAMAQUENSIS KLAVERENSIS, Roberts

1926. Ann. Transv. Mus. XI, p. 254.
Klaver, Cape Province.

29. THALLOMYS NAMAQUENSIS DRAKENSBERGI, Roberts

1926. Ann. Transv. Mus. XI, p. 255.
Utrecht, Natal.

30. THALLOMYS NAMAQUENSIS CENTRALIS, Schwann

1906. Proc. Zool. Soc. London, p. 107.
Deelfontein, Cape Colony.

Genus 38. RATTUS, Fischer

1803. RATTUS, Fischer, Das Nationalmuseum der Naturgeschichte zu Paris, vol. 2, p. 128.

1881. EPIMYS, Trouessart, Bull. Soc. Études, Sci. Angers, X, p. 117. (*Mus rattus*, Linnaeus.)

1903. LENOTHRIX, Miller. Proc. U.S. Nat. Mus. XXVI, p. 466. (*Lenothrix canus*, Miller.)

1905. BULLIMUS, Mearns, Proc. U.S. Nat. Mus. XXVIII, p. 450. (*Bullimus bagopus*, Mearns.)

(?)1905. LIMNOMYS, Mearns, Proc. U.S. Nat. Mus. XXVIII, p. 451. (*Limnomys sibuanus*, Mearns. See p. 295.)

1910. BUNOMYS, Thomas, Ann. Mag. Nat. Hist. 8, VI, p. 508. (*Mus coelestis*, Thomas.)

1910. STENOMYS, Thomas, Ann. Mag. Nat. Hist. 8, VI, p. 507. (*Mus verecundus*, Thomas.)

1912. CREMNOMYS, Wroughton, Journ. Bombay, Nat. Hist. Soc. XXI, p. 340. (*Cremnomys cutchicus*, Wroughton.)

1915. PRAOMYS, Thomas, Ann. Mag. Nat. Hist. 8, XVI, p. 477. (*Mus tullbergi*, Thomas.) Valid as a subgenus.

1915. Myomys, Thomas, Ann. Mag. Nat. Hist. 8, XVI, p. 477. (*Mus colonus*, Smith.) Valid as a subgenus.
1915. Mastomys, Thomas, Ann. Mag. Nat. Hist. 8, XVI, p. 477. (*Mus coucha*, Smith.) Valid as a subgenus.
1916. Diplothrix, Thomas, Journ. Bombay Nat. Hist. Soc. XXIV, p. 404, footnote. (*Lenothrix legata*, Thomas.)
1920. Ochromys, Thomas, Ann. Mag. Nat. Hist. 9, V, p. 142. (*Mus woosnami*, Schwann.) Valid as a subgenus.
1926. Stochomys, Thomas, Ann. Mag. Nat. Hist. 9, XVII, p. 176. (*Dasymys longicaudatus*, Tullberg.) Valid as a subgenus.
1926. Dephomys, Thomas, Ann. Mag. Nat. Hist. 9, XVII, p. 177. (*Mus defua*, Miller.) Valid as a subgenus.
1926. Hylomyscus, Thomas, Ann. Mag. Nat. Hist. 9, XVII, p. 178. (*Epimys aeta*, Thomas.) Valid as a subgenus.
1936. Maxomys, Sody, Naturk. Tidjschr. Ned. Ind. 96, p. 55. (*Mus bartelsi*, Jentink.)
Micaëlamys, New (below). (*Mus granti*, Wroughton.) Valid as a subgenus.

Type Species.—*Mus decumanus*, Pallas = *Mus norvegicus*, Berkenhout (see Miller, List N. American Recent Mammals, p. 428, 1923; according to Tate, 1936, and Rümmler, 1938, the type is *Mus rattus*, Linnaeus).

Range.—Palaearctic: throughout Europe, "whole of European part of U.S.S.R., southern regions of Siberia, and Far East; some localities in Northern Siberia (upper reaches of River Lena, Commander Islands, Kamchatka)" (Vinogradov); Turkestan; China; Japan; Kashmir; Syria; North Africa. Indo-Malayan: very many groups extend throughout the whole area. Australasian: New Guinea, Ceram, Solomon Islands, Australia, Tasmania. African: Sudan, Abyssinia, Somaliland, Kenya, Uganda, Tanganyika; Liberia, Gold Coast, Nigeria, Cameroons, Congo, Angola; South Africa generally.

Number of Forms.—I have listed five hundred and fifty-four.

Detail notes on the range of the genus, with specific groups, are included below (the species *rattus* and *norvegicus*, the House-Rats, are accidentally introduced to America, and may be found anywhere. Apart from these, the *concolor* group appears to range eastwards to certain Pacific Islands, as Fiji, Hawaii, etc.).

Palaearctic:

Europe: *rattus* and *norvegicus* groups only.

Siberia: *rattus* and *norvegicus* groups only (three species recognized by Vinogradov as occurring in the U.S.S.R., *rattus*, *turkestanicus*, and *norvegicus*).

China, north of the Yangtsekiang, and Japan: *rattus* group (including Japanese *tanezumi*); *norvegicus* group, and *confucianus* group (north to Chihli).

Indo-Malayan:

India: ten groups occur, distributed as follows—generally: *rattus* group. Peninsula only: *blanfordi* and *cutchicus* groups. Himalayas chiefly: *confucianus* and *eha* groups. Burma: *concolor*, *bowersi*, *berdmorei*, and *cremoriventer* groups. Himalayas and Assam: *edwardsi* group.

The *rajah* and *mülleri* groups may occur in Tenasserim.

It appears, therefore, that only three groups occur in the Peninsula of India, two of them being restricted to it.

China, south of the Yangtsekiang: *rattus*, *norvegicus*, *bowersi*, *confucianus*, *cha*, *edwardsi* groups; *rajah* group (Formosa); *canus* group (Liukiu).

Siam and Malay Peninsula: *rattus*, *mülleri*, *confucianus*, *cremoriventer*, *whiteheadi*, *rajah*, *edwardsi*, and *berdmorei* groups.

Sumatra, and adjacent islands: *baluensis*, *canus*, *rattus*, *concolor*, *mülleri*, *confucianus*, *cremoriventer*, *whiteheadi*, *rajah*, and *edwardsi* groups.

Java: *canus*, *rattus*, *concolor*, *mülleri*, *confucianus*, *cremoriventer*, *lepturus*, *bartelsi*, *rajah*, and *edwardsi* groups.

Christmas Island, south of Java: *macleari* and *nativittatus* groups.

Borneo: *baluensis*, *rattus*, *concolor*, *mülleri*, *confucianus*, *baeodon*, *cremoriventer*, *whiteheadi*, *rajah*, *edwardsi* groups.

Celebes: *rattus*, *hoffmani*, *concolor*, *confucianus*, *cremoriventer*, *whiteheadi*, *rajah*, *xanthurus*, *chrysocomus*, *coelestis* groups.

Philippines: *rattus*, *norvegicus*, *concolor*, *xanthurus*, *rajah* groups.

Australasian:

New Guinea: *rattus*, *concolor*, *leucopus*, *tunneyi*, *verecundus*, *niobe* groups.

Australia: *leucopus*, *tunneyi*, *fuscipes* groups (the first from Queensland only).

Africa:

Morocco: *rattus* and *coucha* groups.

West Africa: *tullbergi*, *aeta*, *defua*, *verreauxi*, *coucha* groups.

Central Africa (Cameroons, Congo): *longicaudatus*, *tullbergi*, *aeta*, *verreauxi* groups.

East Africa: *rattus*, *tullbergi*, *aeta*, *verreauxi*, *coucha* groups (the last two as far as Abyssinia, and in case of *verreauxi* group, Somaliland).

South Africa: *verreauxi*, *coucha*, *granti*, *woosnami* groups.

The groups typified by "*rattus*" and "*norvegicus*" are included in the above list only when a race has been described from a given area.

CHARACTERS.—The genus *Rattus*, containing about half the named forms in the subfamily, and being the largest genus in the Order, is by no means easy to define. Tate in 1936 has published what amounts to more or less a revision of the Indo-Malayan and New Guinea forms of *Rattus* as currently recognized (Bull. Amer. Mus. Nat. Hist. LXXII, pp. 512–580). The present classification has been based principally on Tate's arrangement.

Many groups, which appear to be absolutely indistinguishable from typical *Rattus*, so far as valid generic characters are concerned, have received generic or subgeneric names comparatively recently. These will be dealt with below.

There is a general tendency throughout the genus towards a somewhat simplified form of dental pattern, with cusps on the main laminae tending to merge into each other, at least to a certain degree. Some species approach the *Uromys-Melomys* series of genera in simplification, as, for example, *lepturus*, *whiteheadi* group, some members of *confucianus* group, *cremoriventer* group. A few rather primitive(?) forms retain a certain angularity of cusps, and are, for the genus, more complex-toothed than is normal, as *macleari*, *nativittatus*, *legatus*, *blanfordi*, *cutchicus* groups; between these extremes are intermediate forms, most noteworthy of which are the House-Rats, *rattus* (with allies) and *norvegicus*, in which the teeth may be moderately to rather strongly cuspidate.

Mammary formula has been used, in certain African "genera," for generic purposes, as has the number of roots of M.1, which are typically but by no means constantly 5 in normal *Rattus*. Neither of these characters is of the slightest generic value, as will be shown below.

Mammary formula.—Of species of *Rattus* which have not yet received a generic name, the following formulas are known:

Mammae 3—3 = 12.	In *norvegicus*, *rattus* group (part), *tunneyi* group (part).
Mammae 3—2 = 10.	In *berdmorei*, *vicerex*, *mackenziei*, *manipulus*.
Mammae 2—3 = 10.	In *rattus* group (part), *tunneyi* group (part).
Mammae 2—2 = 8.	In *concolor* group, *mülleri* group, *ringens* group (part), *xanthurus* group (part), *huang* group, *cremoriventer* group, *whiteheadi* group, *sabanus* group, *rajah* group, *eha*, *lepturus*.
Mammae 1—3 = 8.	In *hoffmani* group, *rogersi*.
Mammae 1—2 = 6.	In *ringens* group (part), *xanthurus* group (part), *beccarii*, *blanfordi*.
Mammae 0—2 = 4.	In *chrysocomus* group, *xanthurus* group (part), *macleari*, *nativittatus*.

(The above formulas as published by Thomas, Tate, Wroughton.)

Although the character in *rattus* and *norvegicus* (3—3 = 12) is rather extreme compared with the 0—2 = 4 formula, it will be seen that intermediate cases exist throughout, from the one to the other. It thus becomes clear that no genus based primarily on mammary formula can be retained, unless the character has with it other aberrant characters, which are not shared by the present genus.

It is interesting, in fact, to note the characters given to the genus *Rattus* by various authors in their keys to the Rats of any given country.

In St. Leger, Key to African Rodents, 1931, *Rattus* is keyed as with "Mammae 2—3 or 3—3 = 10 or 12 (see table above!), tail moderate or long, naked or sparsely haired, skull with straight or curved anterior border to zygomatic root, M.1 with five roots."

In Wroughton, Indian Mammal Survey, *Rattus* is keyed as "Mammae more than 6; toothrow short, less than 10 mm.," against "*Cremnomys*" (mammae 1—2 = 6). But later, in the same key, we learn that *Rattus blanfordi*, one of the Indian species, actually has the mammae 1—2 = 6!

In Vinogradov, Rodents of the U.S.S.R., *Rattus* appears to be distinguished from the other genera (except *Nesokia*) on size; "length of body in adult more than 130 mm.," although outside the area there are many *Rattus*, as *concolor*, which may be as low as 100 mm. head and body in adult.

In Rümmler, Muridae of New Guinea, 1938, the only characters of the slightest value appear to be that in *Rattus*, as against "*Stenomys*" (= *Rattus*), the bullae are strongly inflated, instead of "smaller," and the rostral part of the skull is shorter and broader. In "*Stenomys*" he includes the species *leucopus*. But according to Tate, the *ringens* group (=*leucopus* group; *ringens* being a race of *leucopus* according to Rümmler), the bullae against occipitonasal percentage is 15–18, whereas in the *rattus* group, which also occurs in New Guinea, the same percentage is 17–20; it will thus be seen that the two "genera"

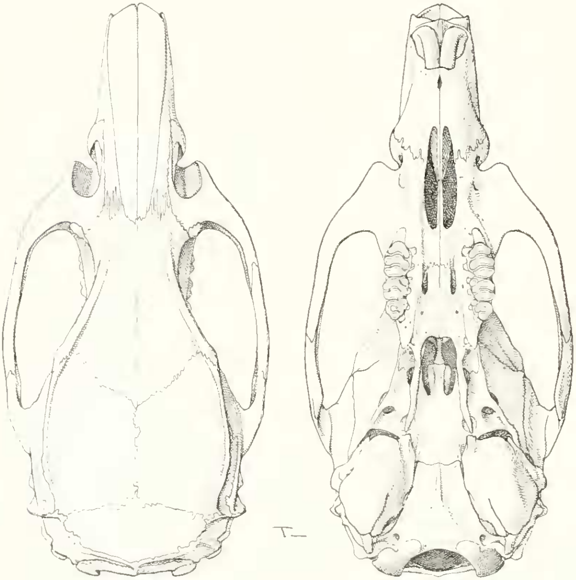

FIG. 10. RATTUS RATTUS RATTUS, Linnaeus.
B.M. No. 1.6.3.7, ♂; × 2½.

of Rümmler overlap; and what this author proposes to do with the numerous species of *Rattus* occurring outside New Guinea, which give a lower percentage than in "*Stenomys*," as *mülleri* group, *edwardsi* group, *rajah* group, *lepturus*, *bartelsi*, and others, is not clear.

In other words, the characters of this genus are in nearly every case different in one country from what they are in another, in order that some group, quite indistinguishable from the genus *Rattus* as a whole, may be retained under another name in each given country.

Cranial characters.—Typically, as in *R. rattus*, the skull shows moderate interorbital constriction, strong supraorbital ridges, which extend backwards over the braincase, large interparietal, and relatively broad braincase. Zygomatic plate moderate, slightly cut back above; as a rule not very strongly so. Incisive

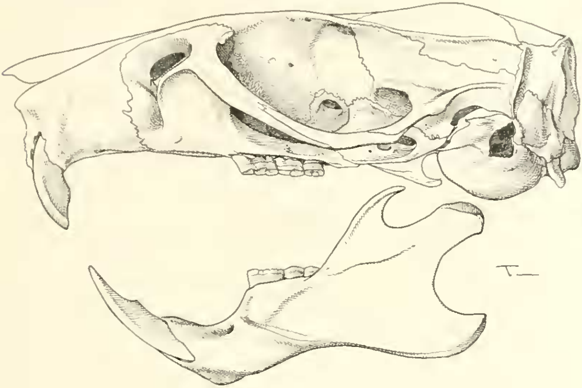

FIG. 11. RATTUS RATTUS RATTUS, Linnaeus.
B.M. No. 1.6.3.7, ♂; × 2½.

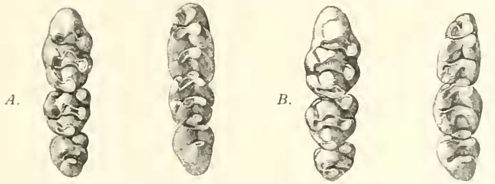

FIG. 12. *A*. RATTUS RATTUS, Linnaeus; *B*. RATTUS NORVEGICUS, Berkenhout.
Cheekteeth: × 5.

foramina rather long, terminating about on a line with first molars. Posterior part of palate extending slightly behind M.3. Bullae of moderate or largish size.

The braincase is narrowed in *norvegicus*, and rarely in other forms, as, for example, *nativittatus*. In *norvegicus*, the zygomatic plate is more projected forwards than is usual. Conversely in some species, as *lepturus*, *cha*, and others, it is almost straight anteriorly. The supraorbital ridges are relatively very weak or almost absent in *bowersi* (a large form); in *elia*, and in several Australian species, as *fuscipes*, etc. The incisive foramina vary greatly. In *lutreolus* they are much narrowed; in the *rajah* group they are shortened and specialized; in *inflatus* they are much broadened. The bullae are strongly inflated in the Australian *tunneyi* group, and in some other forms, as *blanfordi* and *everetti*. On the other hand, they are very strongly reduced in some members of the *edwardsi* group. Except in the *rattus* group and *norvegicus*, the palate very generally does not extend behind the posterior molars. Further details will be discussed below.

Teeth.—Incisors various, but not pro-odont, except in *berdmorei* and *manipulus*. Lower incisor root as a general rule not showing very much on the mandible, and never extreme in this character. M.1 typically five-rooted; three-rooted in *rajah* and *surifer*; four-rooted in other species, as noted below. Typically, M.3 is little reduced. M.1 with eight cusps, the outer row moderately developed, the general effect tending to become simple, though less so in *rattus* and *norvegicus* than in many forms. M.2 with T.1 strong, T.3 most often vestigial or absent, T.4, 5, 6, and T.8 and 9 present. T.3, the antero-external cusp, sometimes tends to become strongly reduced in the first molar, as in *R. norvegicus*, and in many species of the *rajah* group. M.3 normally with three laminae traceable, the first consisting of T.1 only, the posterior narrowed, and small. The dentition is very heavy, with thick cusps, in some Australian types, as *fuscipes* and *lutreolus*, but there is no extreme angularity of cusps such as characterizes many "complex-toothed" African genera. Teeth strongly hypsodont in *luzonicus*, *bagopus*, *lutreolus*. In the progressive division of Tate, containing the Indo-Malayan *confucianus*, *cremoriventer*, *whiteheadi*, *edwardsi*, *rajah*, *lepturus*, and *bartelsi* groups, there is a tendency for the molars to lose all cusps in the adult, or more or less, and for strong reduction of M.3. In *blanfordi*, *macleari*, *nativittatus*, *cutchicus* groups, and *legatus*, the molars are more complex and angular than is usual. In *macleari* and *baluensis*, a small posterointernal cusp may be traceable. Lower molars as a rule without special peculiarity; outer subsidiary cusps may be present or absent; terminal heel of M.1 and M.2 usually developed.

Bullae.—The following table shows the percentage of bullae against occipito-nasal length in the various groups, and indicates intermediates between every extreme:

tunneyi group	20–24 per cent
berdmorei	19 ,, ,,
blanfordi	19 ,, ,,
rattus group	17–20 ,, ,,
fuscipes group	17–19 ,, ,,
norvegicus . . . . . . *circa*	18 ,, ,,
xanthurus, members with larger bullae . .	16–18 ,, ,,
concolor group . . . . . *circa*	17 ,, ,,
cutchicus group . . . . . *circa*	17 ,, ,,
stella group	16–18 ,, ,,
verreauxi group	15–17 ,, ,,

confucianus group		15–17 per cent
chrysocomus group		15–17 ,, ,,
coucha group		14–17 ,, ,,
bowersi	*circa*	15 ,, ,,
tullbergi	*circa*	15 ,, ,,
coelestis		15 ,, ,,
leucopus group		14–18 ,, ,,
verecundus group	*circa*	15 ,, ,,
cremoriventer group		14–17 ,, ,,
whiteheadi group		12–15 ,, ,,
lepturus group		12–14 ,, ,,
bartelsi		12–14 ,, ,,
dominator		12–13 ,, ,,
nativittatus	*circa*	14 ,, ,,
macleari	*circa*	13 ,, ,,
mülleri group		12–14 ,, ,,
longicaudatus	*circa*	12 ,, ,,
rajah group		11–14 ,, ,,
edwardsi group		9–11 ,, ,,

External characters.—The external characters are, as might be expected, variable. Typically, as, for example, *R. rattus*, they present the following features. Build rather thickset. Hindfoot terrestrial; D.2, 3, and 4 subequal and longest; D.5 reaching well past base of D.4; hallux moderate, shorter than D.5. Forefoot with D.3 and D.4 longest, next D.2; D.5 not strongly reduced as a rule. Fur harsh. Tail relatively long, not well haired, but not with the great scarcity of hairs found in such genera as *Uromys*. Ear medium. Plantar pads 6. *R. norvegicus* usually has the tail shorter than the head and body. In a very large number of forms, it is considerably longer, and may be extremely lengthened, as, for example, in *lepturus*. As a general rule, no extreme digit reduction takes place as regards the hallux and D.5 of the hindfoot; but in the *rajah* group, D.5 very generally does not reach past the base of D.4, and in the type of *R. moi*, the foot is scarcely to be distinguished from the *Arvicanthis* type. The hindfoot is considerably modified for arboreal life in the *cremoriventer* group, and may be more or less of arboreal type in the *confucianus* group, and apparently in several Indo-Malayan representatives of the *rattus* group. I have not seen *R. beccarii*, from Celebes, which is said by Tate to have the foot much specialized for arboreal life. The *R. concolor* group is characterized by, for the genus, very small size, with head and body in the neighbourhood sometimes of 100 mm.; the *whiteheadi* rats are not much larger. In the *R. sabanus-edwardsi* group, the size becomes largest for the genus, with a head and body up to 290 mm.

The fur is densely spiny in some members of the *rajah* group, most members of the *leucopus* group, and the *whiteheadi* group. On the other hand, it is extremely thick and soft in *R. eha*, *R. lepturus*, *R. bartelsi*, some of the Celebes *chrysocomus* group, and many Australian species, such as *fuscipes*. The foot is strongly narrowed in *bartelsi*, and in *fratrorum* (*chrysocomus* group). The tail is very naked in *R. macleari* and *R. nativittatus*, from Christmas Island, being not unlike that of *Uromys* in these species. Further details will be discussed when dealing with the groups.

A few notes may be added on the main characters of each specific group. It will be more convenient to deal first with the twenty odd groups which occur in the Indo-Malayan region, three of which, *rattus*, *norvegicus*, and *confucianus*, have penetrated into the Palaearctic region.

1. *baluensis* group. *Incertae sedis.* So far as the British Museum is concerned, two skulls only are represented: type of *baluensis* and type of *korinchi*. In both of these a small posterointernal cusp is traceable in M.1. In *baluensis*, an old specimen, this cusp is not present in M.2; in *korinchi*, it is quite well developed in both. This feature leads me to believe that if a large series came to hand, and it proved to be a constant character, the species would require generic separation from *Rattus*; but for the moment so few are available that the question must wait until more come to hand. The species do not agree either with *Apodemus* or *Lenomys*, the two most generalized and *Rattus*-like of the "posterointernal series" of genera, but appear otherwise to belong to the present genus.

   Tate treats the species as members of the *rattus* group, and states that the mammae of *baluensis* are 2—3 = 10. Fur rather soft. (Sumatra, Borneo.)

2. *macleari* group. The skull is without extreme peculiarity. The molars are complex, more or less *Lenomys*-like, the cusps rather sharply projecting from each other, the outer ones well developed and pointing outwards; something after the manner of *Lenomys*, or *Dacnomys*. In five out of eight skulls examined, a vestigial posterointernal cusp may be traced in M.1 and M.2. The teeth are quite hypsodont.

   Bullae rather small. Mammae 0—2 = 4. Large forms; up to 228 head and body, or perhaps more. Foot relatively long. Tail very naked.

   One species: *macleari*, from Christmas Island, south of Java. Tate regards it as a member of the *xanthurus* group, but the dentition is altogether too complex, and the presence (sometimes) of a vestigial posterointernal cusp suggests that it is more primitive than in most other *Rattus*.

3. *nativittatus* group. Braincase tends to be rather narrow, and reminiscent of that of *norvegicus*. M.1 evidently five-rooted. Cheekteeth more complex and angular than is normal in *Rattus*, but the posterointernal cusp is suppressed. Mammae 0—2 = 4. Tail naked, of the mosaic-form found in *Uromys* and *Melomys*, but teeth widely different from those genera, and skull quite as in typical *Rattus*. Large forms. Up to 265 head and body. Claws relatively large.

   One species: *nativittatus*, from Christmas Island, south of Java. One of the more aberrant members of the genus; but more like normal *Rattus* dentally than is *macleari*.

4. *blanfordi* group. Zygomatic plate more strongly cut back above than is usual. Bullae very large, about 19 per cent of occipitonasal. Palate extending to just behind M.3. Molars with cusps quite prominent, angular and the outer row projecting outwards, not far from *macleari* type (but no posterointernal traceable, as is normal); M.3 rather small.

   Mammae 1—2=6. Relatively large; up to 195 mm. head and body, or perhaps more. D.5 hindfoot rather long; tail longer than head and body, relatively well haired.

   One species: *blanfordi*, from Peninsular India, which, as has been pointed out by Thomas and Hinton, is a more complex or angular toothed type than is normal in *Rattus*.

5. *cutchicus* group. Skull quite like that of a small *blanfordi*, except that the bullae are smaller, the zygomatic plate not much cut back above, and the palatal foramina are longer, tending to penetrate between the front molars (this is a somewhat variable character in *blanfordi*, though it is not extreme as in the present group). Molars near *blanfordi*, rather broad in appearance; M.3 rather reduced. Size smaller than in *blanfordi* (105–149 mm. head and body). Mammae 1—2=6. Tail normally longer than head and body, quite well haired. D.5 relatively long; hindfoot appears somewhat arboreal.

   R. cutchicus and allies, Peninsular India=the genus "*Cremnomys*" of Wroughton. The group was originally described as an ally of *Millardia*, and compared with it; and every character placed against "*Cremnomys*" by Wroughton is a typical *Rattus* character (plantar pads 6; fifth hindtoe not reduced; tail long; molars normal). The group is, in fact, I think, composed of small allies of *blanfordi*, bearing much the same relationship to the latter that the smaller *R. niobe* group bears to the larger *R. verecundus* in New Guinea.

6. *canus* group. *R. canus*, from Pulau Tuangku (Sumatra), Java, and Southern Malay Peninsula, and *R. legatus* from Liukiu. *R. legatus* only has been seen, the type skull of which lacks bullae. Rather large form; supraorbital ridges very heavy; zygomatic plate straight anteriorly; molars complex, of same general type as *macleari* (but no posterointernal traceable); M.3 little reduced; lower molars complex, with large outer subsidiary cusps. *R. legatus* has thick fur, intermixed with which are spines. The tail is very well haired for a member of this genus. Plantar pads 6.

   R. canus was originally described as a new genus, "*Lenothrix*," but Kloss and other authors have regarded it as a synonym of *Rattus*. Thomas described *legatus* as a *Lenothrix*, but later on the trivial character of the heavier braincase separated it as "*Diplothrix*." It appears to be a well-differentiated species of more complex-toothed *Rattus*. I have no notes on the mammary formula.

After the above six species or groups we pass to those more normal groups of *Rattus* in which the molars are not angular, as a rule only moderately heavily cuspidate, or in some cases are becoming strictly simple, though within any of the larger groups below may be some forms which will occasionally approach those above.

7. *rattus* group. The skull of this group (taken as typical of the genus), has already been described above. The molars are moderately cusped in the young, not excessively heavy; and the cusps on the laminae in adult teeth tend to fuse into each other to a certain degree. The group seems intermediate between the above described more angular types, and such forms as *cremoriventer* group, etc., which are nearer the *Uromys* type of dentition.

   The bullae are relatively large (17–20 per cent of occipitonasal length). M.3 little reduced comparatively (25 per cent of molar crown series, 55 per cent of M.1, Tate).

   Tail usually longer than head and body, but not always so.

   Mammae 3—3 = 12 or 2—3 = 10. Moderate-sized forms as a rule, 144 mm. head and body or more, usually under 200, but in some cases more (to 230). The foot in some Indo-Malayan representatives of the group has an arboreal appearance. The external characters of *R. rattus* have already been dealt with.

   This group is principally Indo-Malayan, though a few races of *R. rattus* have become more or less cosmopolitan. In the list which follows (list of named forms), in this and all the other larger Indo-Malayan groups I have followed the classification of Tate, who has allocated to these various groups almost all the named species. There are many species from Indo-Malayan area which are described binomially by American authors, many of which will probably prove to be merely insular subspecific representatives of the better-known species. Above all, this is apparent in the Philippine Islands, very few of the numerous forms of which are represented in London. To the *rattus* group belongs apparently *vicerex* and its ally *turkestanicus*; and Tate places the species *gestri* in the group, from New Guinea; though perhaps it might be a member of the *tunneyi* group. Also *flavipectus* from China appears to conform to the *rattus*-group type; while *losea* (Formosa) and *tanezumi* (Japan), are provisionally referred here, though I have no notes of the mammary formula of either, and the cusps of the molars of both appear to tend to be more heavy than is normal.

8. *norvegicus* group. *R. norvegicus* differs from *R. rattus* in the relatively shorter tail, which is shorter than the head and body, in the more narrowed braincase, the outline of which is distinguishable at a glance, and in the more reduced anteroexternal cusp of M.1. In two specimens seen there are traces of an extra front lamina to M.1, as in many Australian species. M.1 is five-rooted. The zygomatic plate is more strongly cut back above than is usual.

   Mammae 3—3 = 12.

   Notwithstanding the above-mentioned differences, *norvegicus* and *rattus* agree in very many essential characters. I am of the opinion that the two forms are closely related. Tate refers the *norvegicus* Rats to the *rattus* group. It is more than clear that there can be no question of subgeneric recognition between them (Miller, 1923, refers the two species to distinct subgenera), unless almost every group recognized here receives a new subgeneric name. The whole of Tate's "progressive division," for instance, are much more widely separated from *rattus* than is *norvegicus*, and the same applies to many Celebes and Australian groups of Tate's "primitive division," or so it seems to me.

R. norvegicus is more or less cosmopolitan, but seems to be primarily Palaearctic; in the group is included the closely allied Chinese *humiliatus*, and a few forms described by Miller from the Nicobar Islands (not seen), as "not remote from *norvegicus*"; also *tyrannus*, which is included by Taylor in the *norvegicus* group, from the Philippines.

9. *concolor* group. Cranially and dentally like the *rattus* group; but size much smaller (about 100 to 140), and mammae 2—2 = 8. Tail as a rule longer than head and body. Some of the smallest members of the typical subgenus.

   Burma, Sumatra, Java, Borneo, Celebes, Philippines, New Guinea, Fiji, Hawaii.

10. *mülleri* group. Differing from the *rattus* group as follows: usually larger in size (though the measurements may overlap in large members of *rattus* group); about 180–222 mm. head and body. Mammae 2—2 = 8. Molars rather heavy. Typically, bullae strongly reduced (about 12–14 per cent of occipitonasal length). However, in *jarak* and *villosus* the bullae are less reduced.

    Burma, Malay Peninsula, Sumatra, Java, Borneo.

11. *xanthurus* group. This assemblage, from the Philippines and Celebes, does not altogether give the appearance of a natural group. Further work may suggest the desirability of splitting it. Few forms are represented in the British Museum; I have seen only *xanthurus*, *marmosurus*, *luzonicus*, *bagopus*, *dominator*, *everetti*, *albigularis*, *celebensis* and *callitrichus*.

    So far as seen the molars are rather heavy, and are well cusped in the young, though in some cases the cusps wear down in the adult. The size is usually large (187–260 mm. head and body). The bullae may be very large (16–18 per cent occipitonasal, Tate), or relatively small (12–13 per cent, *dominator*). According to Tate, "three well-marked types can be noticed, the *bontanus* type which approaches the *rattus* group in its arched skull, but nevertheless differs by its large teeth, long palatal foramina, and small bullae; the *xanthurus* type, with smaller teeth, larger bullae, and larger foramina; and the *dominator* type, with moderately large teeth, small bullae, and quite small foramina." The mammae may be 2—2 = 8, 1—2 = 6, or 0—2 = 4, according to Tate.

    R. luzonicus and *R. bagopus* have been referred to Mearns' genus "*Bullimus*," which Thomas has shown to be a synonym of *Rattus*;

"*Bullimus*" is regarded by Taylor and Hollister as retainable on account of the hypsodont teeth and peculiar mammary formula; but a glance at the table above will show that the formula 1—3=8 is by no means unknown elsewhere in the genus, occurring in the *hoffmani* group of Celebes, and in *rogersi*, from the Andaman Islands, while the molars do not appear to me to be more hypsodont than is the case of the Australian species *lutreolus*. *R. luzonicus* is referred by Tate to the present group. This author also refers, in addition to the above-mentioned forms, *facetus*, *hamatus*, *tacrae*, *tondanus*, *arcuatus*, *salocco*, *microbullatus*, *punicans*, *tagulayensis*, *albigularis*, and *gala* to the present group.

Many of the forms referred to this group have thick soft fur.

The zygomatic plate is rather strongly projected forwards in *dominator*.

The molars of adult *luzonicus* appear simplified and scarcely cuspidate.

12. *hoffmani* group. This group, from Celebes, does not appear to be represented in London. The bullae are smaller and the molars larger than in the *rattus* group, and the mammary formula is 1—3=8 (Tate). See note at end of List of Named Forms, p. 215.

13. *chrysocomus* group. Celebes. Very few of these are represented in London. The supraorbital ridges appear rather weak. The molars are heavier than in *rattus* group, according to Tate; the rostrum long, in old specimens becoming wide and heavy. Mammae 0—2=4. Foot long and narrow.

Head and body 145–198 mm. (from Tate's measurements).

In this group Tate includes *fratrorum*, *andrewsi*, *penitus*, *rallus*, *brevimolaris*, *nigellus*, all from Celebes.

14. *coelestis* group. *R. coelestis* from Celebes=the genus "*Bunomys*" of Thomas. This is shown by Tate to be probably no more than a slightly specialized offshoot of the *chrysocomus* group; "this genus seems to comprise merely offshoots of the *Rattus chrysocomus* group which have become slightly fossorial, as indicated by their lengthened claws. The adult skull possesses the lengthened rostrum with tendency to expansion at its anterior end and the widened posterior portion of the braincase as well as a sloping zygomatic plate, all of which characters appear in the *chrysocomus* group" . . . "it appears that the Mengkoka form *koka* constitutes a geographical race differing from true *coelestis* in being smaller, with a smaller hindfoot, and shorter claws (thus becoming annectant with the *chrysocomus* group of *Rattus*). . . ." According to Tate, the interparietal may be reduced. Thomas suggested that the group is allied to "*Stenomys*" (*verecundus* and *niobe* groups) of New Guinea, but Tate does not agree with this assumption. Nevertheless the skulls of the two, both rather extreme, resemble one another to a considerable degree.

Mammae 0—2=4. It may be mentioned that the development of the foreclaws (one of the main characters for the genus of Thomas) is very slight compared with really fossorial Rodents as *Notiomys*, *Prometheomys*, *Myospalax*, etc.

Head and body 148 (type specimen); or up to 178 from Tate's measurements.

Although some of the groups occurring in Australasia are included in the present division of *Rattus* by Tate, it is more convenient to deal with these later, and pass now to that section of *Rattus* which Tate regards as more progressive than the forms mentioned above. As characters mentioned by Tate for this division are the "varyingly marked degrees of reduction of M.3 (the length of the crown of M.3 varying from 38 to 50 per cent of length of crown of M.1); marked reduction in size and change in form of the bullae, which rarely exceed 15 per cent of the occipitonasal length; tendency towards development of short palatal foramina, pointed at the front and widely rounded behind."

However, it must be noted that some forms of the primitive division of Tate just dealt with, such as the *mülleri* group, and *dominator*, have bullae as reduced as in this division. Tate also states that the mammary formula 2—2 = 8 is constant throughout this group (or less than 8 in some cases); but an exception to this appears to be the Indian species *mackenziei*, described as near *bowersi* (which Tate refers to the *edwardsi-sabanus* group), but which has the mammae 3—2 = 10.

15. *confucianus* group (= the *huang* group of Tate). As indicated above, M.3 is reduced, more so than is usual in the groups treated above.

The bullae are 15–17 per cent of occipitonasal length.

This group contains a large number of forms; some, such as *fulvescens*, appear to be more or less without clear cusps, and near the simple type of tooth, in all seen; *confucianus* usually has cusps more or less apparent. *R. andersoni*, which is thought by Thomas to be near this type of animal, appears to have rather heavily cusped molars (too heavily cusped for the present group), though M.3 is small. The bullae, however, are about as in the present group.

The status of this species seems somewhat doubtful. In a specimen of *niveiventer*, M.1 appears four-rooted, but in *confucianus* it is five-rooted.

The size is moderate (about 108–178 head and body). The tail usually longer than head and body.

Mammae 2—2 = 8? Often in this group, the foot is more or less of arboreal type, with rather long D.5. The fur may be soft or spiny, even within the same species. Tate states that the group comprises two sections, "the more typical, containing *huang* and *fulvescens*, has mixed black and cinnamon coloured upper pelage with self-coloured whitish underparts; the other, *confucianus* and allies, which occurs only in the northern part of the range of the group (China), has fuscous upperparts, and beneath is white."

The group ranges into Palaearctic China (Tibet, Shantung, Shensi, Chihli), also in Nepal, Burma, Sumatra, Java, Borneo. The main species are *confucianus*, *niveiventer*, *huang*, *fulvescens*, *andersoni*, the status of which is described above, and perhaps *musschenbroekii*, which Tate regards as intermediate in foot structure between this group and the *rajah* group.

The skull resembles that of the *rajah* group, including the formation of the palatal foramina. *R. ling* also seems to belong here, on foot structure, rather than with the *cremoriventer* group as suggested by Tate. Other species are *excelsior* and *culturatus* (according to descriptions), and those referred to the group by Tate, which are listed below.

16. *cremoriventer* group. M.1 appears five-rooted. The teeth of all seen with one exception are of simple laminate type.

Zygomatic plate nearly straight anteriorly. M.3 reduced, and braincase broad, as in last group. Rather small; about 125–153 head and body. Feet considerably modified for arboreal life; fur sometimes spiny. Tail long, pencilled terminally.

Siam, Sumatra, Java, Borneo.

Tate suggests that *R. beccarii* (not seen), from Celebes, may be derived from this group. (Mammae 1—2=6, and feet said to be highly specialized for arboreal life.)

17. *whiteheadi* group. A group of small Rats, with so far as seen molars quite simplified; M.1 four-rooted (*asper*); skull like the two preceding groups. Tail subequal in length to head and body; head and body 98–133 mm. Usually spiny.

Siam, Sumatra, Borneo, Celebes.

18. *bacodon* group. Like the last, but toothrow unusually reduced, less than 14 per cent of condylobasal length. One species from Borneo.

19. *lepturus* group. *R. lepturus* was not allocated to group by Tate, who suggests it may be allied to the *eha* Rats. Mammae 2—2=8. The fur is very soft. The tail much longer than the head and body. The zygomatic plate is straight anteriorly. Bullae strongly reduced, about 13 per cent of occipitonasal length (12–14 per cent, Tate). In all examined, the molar cusps are obsolete, the teeth simple. D.5 hindfoot is relatively long; the foot not narrowed. The toothrow is unusually long for the genus (20 per cent or more condylobasal length). *R. lepturus*, Java. Head and body 124–170 mm.

20. *eha* group. Like the last in most essential characters, but differing in the fact that the supraorbital ridges are scarcely developed, the toothrow shorter, about 17 per cent of condylobasal length; and the smaller size (about 98–140 mm.). The bullae are roughly 14 per cent of occipitonasal length. Essential external characters as *lepturus*. The molars originally are moderately cusped. M.3 is strongly reduced both in the present species and *lepturus*. *R. eha*, Sikkim to Yunnan.

21. *bartelsi* group. Zygomatic plate tends to be sloping backwards anteriorly, as in *coelestis*, etc., and infraorbital foramen rather narrow. Molars with cusps apparent, not completely simple. Bullae strongly reduced. Mammae 1—2=6. Hindfoot long, much narrowed. Head and body

135–178 mm. Tail not much longer than head and body, rather more naked than is usual.

This species is not allocated to group by Tate. It has recently been made the type of a new genus *Maxomys* by Sody, but does not seem to be more differentiated from the more progressive small Rats of the area than is, for example, *eha* or *lepturus*. Sody's characters, namely the number of rings to the tail 25 to the centimetre, more than in other Javanese Rats, and the mammae (six instead of eight!) are much too slight for generic purposes. Probably if all the Rats belonging to the genus were examined more would be found with similar tail characters; see note on *R. hellwaldi*, p. 218. There are certainly more with six mammae, and even some with only four.

22. *rajah* group. Rostrum pointed, braincase broad, supraorbital ridges strong. Zygomatic plate often nearly straight. Bullae very small. Palatal foramina short, in front of toothrows, specialized in form, narrow in front, broad behind. Molar cusps as a rule quite clear; in many examined T.3 the anteroexternal cusp of M.1 is becoming strongly reduced, as in *R. norvegicus*. In *hellwaldi* there is a fourth cusp on the inner side of the second lamina of M.1 and M.2. In the young, the molar cusps may be quite angular, in species of this group. M.1 is three-rooted in specimens examined of *rajah* and *surifer*. M.3 is quite strongly reduced. Size as a rule larger than in preceding forms (135 to 235 mm. head and body approximately).

In *inflatus*, the palatal foramina are extremely broadened. There is a strong tendency in this group for the outer digits of the hindfoot to be reduced, which culminates in *R. moi*, which is in this respect more or less indistinguishable from the condition found in *Arvicanthis*. This species (type skin seen only) has a longer hindfoot than is normal (25 per cent head and body length). The fur is normally spiny in this group, but soft in *hellwaldi* from Celebes, which, however, agrees in foot structure with the majority. D.5 is clearly longer than the hallux in the majority of the *rajah* Rats, but scarcely reaches past the base of D.4. Tate suggests that the animals can leap somewhat. This group is very strongly differentiated from typical *Rattus*, both in foot structure, cranial characters to a degree, and in the number of roots of M.1 (if constant; every specimen examined on the point was clearly three-rooted); and may ultimately be subgenerically separated. Formosa, South China, Burma, Malay Peninsula, Sumatra, Java, Borneo, Celebes, Philippines. The main species are *surifer* and *rajah*; *coxingi* from Formosa is referred to this group by Tate; also *panglima* from the Philippines; as indicated, *moi*, *inflatus*, and *hellwaldi* appear distinct from the majority.

23. *edwardsi-sabanus* group. Large Rats, becoming as large as any forms of the genus (197–290 mm. head and body). Bullae very strongly reduced (9–11 per cent of occipitonasal length). Molars cuspidate originally, but more or less simple in adult; M.3, as usual in this section,

strongly reduced. In a young specimen of *sabanus*, M.1 is five-footed. Mammae normally 2—2=8.

This group contains *edwardsi*, *vociferans*, *sabanus*, and others. Osgood refers several forms to *edwardsi* as subspecies (as listed below). Southern China, Burma, Malay Peninsula, Sumatra, Java, Borneo.

24. *bowersi* group. This is referred to the *sabanus* group by Tate, but differs clearly in cranial characters (chief of which are the proportionately very weak supraorbital ridges); the differences between the two groups are well defined by Osgood, Field Mus. N.H. Zool., XVIII, 1932, p. 312. In addition to these cranial differences, the bullae of *bowersi* and allies are considerably less reduced than in those members of the *edwardsi* group which I have seen, and are roughly 15 per cent of the occipitonasal length. Mammae 2—2=8, or 3—2=10 in *mackenziei*. South China, Siam, Burma. Osgood states *ferreocanus* belongs in this group, but has smaller bullae. *R. bowersi* is a large form, races of which measure up to 280 mm. in B.M. material.

25. *berdmorei* group. A small group of Rats from Burma and Siam. Incisors pro-odont (elsewhere in the subfamily considered a generic character; but the race *mackenziei feae*, belonging apparently to the previous group, also shows some signs of the character, and may be regarded as an annectant form). Lower incisor root showing on mandible more than is usual. Bullae large (in *berdmorei*), about 19 per cent of occipitonasal length, but appearing much smaller in *manipulus*. Toothrow rather reduced in *berdmorei*. Head and body 182–210 mm. Mammae 3—2=10. Two species, *manipulus* and *berdmorei* only.

Many of the species listed as belonging to the various groups are not represented in London. I have, when possible, checked Tate's results and figures on the many species that are represented; his classification appears for the most part to be very clear, and has undoubtedly gone a long way towards revising this enormous genus.

Australasian Groups

East of Celebes and the Philippines, only two of the above groups occur naturally (other than introduced House-Rats), the *concolor* group, which ranges in New Guinea, and in certain Pacific islands, and the *rattus* group, which is represented by *gestri* in New Guinea. There are, however, five specific groups peculiar to the area in question. Of these, two were referred by Thomas to a genus "*Stenomys*" (*verecundus* and *niobe* groups, New Guinea); one, the *leucopus* group (=the *ringens* group of Tate, *ringens* being regarded as a race of *leucopus* by Rümmler) is chiefly in New Guinea, though also occurring in North Australia, and is referred by Rümmler to "*Stenomys*," and by Tate to the less progressive division of *Rattus* (i.e., that in which *rattus* group, *concolor* group, etc., are placed). Two other groups, typified by *tunneyi* and *fuscipes*, are mostly Australian, though the former is represented in New Guinea. Both are evidently considered by Tate as members of his *rattus* or less progressive division, but both appear to be rather extreme members of the genus.

26. *leucopus* group. The supraorbital ridges are in some cases weak. The rostrum is rather pointed. M.1 is five-rooted. Palate extending rather behind M.3 (as in *norvegicus* and *rattus*). Bullae moderate in size, about 14–16 per cent of occipitonasal length. M.3 is not strongly reduced; the teeth are *rattus*-like, quite well cusped. Mammae 2—2=8 or 1—2=6 (Tate). Fur in most cases spiny, sometimes densely so. Rather large; head and body about 175–252 mm.

New Guinea, Ceram, North Australia. All forms referred to this group are regarded as races of *leucopus* by Rümmler.

27. *verecundus* group. This and the following group constituted the genus *Stenomys* of Thomas, having as its main distinguishing character the "slender long feet" and the "long smooth muzzle." But the muzzle and skull, though a little extreme, are not generically distinct from *Rattus*; *fratrorum*, *bartelsi*, *confucianus*, *eha*, *lepturus*, *whiteheadi*, all may be regarded as transitionary types towards this group in cranial characters to a greater or lesser degree. The hindfoot does not seem to be so narrowed in this group as it is in *Rattus fratrorum* (*chrysocomus* group) and *Rattus bartelsi*. M.1 five-rooted. Mammae 1—2=6.

The braincase is heavier than is usual, and the supraorbital ridges are very weak or absent. There is sometimes little interorbital constriction (particularly in the smaller *niobe* group, following); the zygomatic plate slopes backwards anteriorly, as in *coelestis*, and is often much narrowed. The palate extends slightly behind the last molars. The infraorbital foramen is not so widely open as in *Nesoromys*, which has been referred to "*Stenomys*," neither is the palate anything like so specialized as in *Nesoromys*, which has been fully discussed elsewhere. The molars are quite well cusped and inclined to be rather complex; M.3 is moderate. Tail not very well haired; foot narrow; D.5 rather short. Head and body 136–177 mm.; hindfoot not under 30 (Rümmler). New Guinea. Plantar pads apparently 6.

28. *niobe* group. Like the last, but normally considerably smaller. Head and body 98–145 mm.; hindfoot not over 29 (Rümmler). New Guinea.

29. *tunneyi* group. Placed by Tate in the more primitive division of *Rattus*, and characterized as follows: bullae largest of genus, 20–24 per cent of occipitonasal length; molars broad, large and heavy. Lower incisor root rather prominent on mandible; supraorbital ridges most often present, but may be very weak. Frontals often more constricted than is normal in the genus. Toothrows often longer than is normal in the genus (the highest measured is *conatus*, 20·9 per cent of condylobasal length). Palatal foramina long and narrow, sometimes extending between front molars. M.3 is smaller than M.2, but the molars are sufficiently heavy to be reminiscent of the *Arvicanthis* type in some cases. M.1 appears five-rooted. In a young specimen of *culmorum*, traces of an extra lamina in front of M.1 can be present. The type of *R. melvilleus* has an extra outer cusp on the second lamina of M.1, so that there are four cusps on this lamina.

Mammae 3—3 = 12, or 2—3 = 10 (Tate).

Tate refers the New Guinea species *brachyrhinus* to this group; the following appear to me to belong to it (Australian forms): *woodwardi*, *villosissimus*, *tunneyi*, *culmorum*, *melvilleus*, *colletti*, *conatus*, *sordidus*.

Fur normally rather coarse, but sometimes very soft. *R. villosissimus* appears clearly distinguishable from all others on account of its colour and heavy build. Head and body about 135–200 mm. in the group.

30. *fuscipes-lutreolus* group. Differing from the *tunneyi* group in the following characters: except in *lutreolus* and *assimilis*, very generally the supraorbital ridges are obsolete or absent. The bullae are smaller (17–19 per cent of occipitonasal length). The fur is normally very soft. The molars are on the whole even heavier than in the *tunneyi* group, reaching their heaviest in *lutreolus*, which has in the young extremely heavily cuspidate molars (for the genus), though in this species the pattern is not characterized by angularity of cusps, and wears down quickly to a more or less laminate pattern; the teeth are strongly hypsodont. M.3 is relatively large through the group. The palate tends to be narrowed. The toothrow tends to be longer than in any other *Rattus* measured (including all leading species); in *velutinus*, highest of all measured, 21·4 per cent of condylobasal length. I have no note of the mammary formula beyond 2—3 = 10 for *lutreolus* and *greyi* (Wood Jones); Tate states that in the *assimilis* group, which is named on p. 522, but not dealt with in his paper as it is restricted to Australia and Tasmania, the mammary formula is 0—2 = 4. *R. assimilis* appears to me to belong to the present group.

Head and body about 115–178 mm. The claws may become rather large in *lutreolus*.

In this group I include the Australian species *manicatus*, *mondraineus*, *lutreolus*, *greyi*, *velutinus*, *assimilis*, *fuscipes*. The group is probably closely allied to the *tunneyi* Rats.

Some of these Australian Rats tend to have the outer digits of the hindfoot rather shorter than is normal.

African Groups

All the African groups of *Rattus* have received subgeneric names, which have been accepted recently as full genera. Until much more work is done, it is premature to divide any one of these off as a full genus, based primarily on characters such as mammary formula, number of roots of M.1 (which, as shown above, vary throughout typical *Rattus*), bristly fur, etc. Formerly the whole assemblage of Rats here referred to *Rattus* were included in one genus, originally called *Epimys*, which is antedated by *Rattus*; it is not only convenient and desirable to retain this classification, but there appears to me to be no alternative.

Nearest to typical subgenus *Rattus* stands

31. *longicaudatus* group. (Subgenus *Stochomys*.) This was given generic rank by Thomas on the characters: "Size comparatively large; fur with

elongate bristle-hairs intermixed; tail very long, scaly, naked; mammae 1—2=6; cranial crests strongly developed, amphoral. Palatal foramina not or scarcely longer than toothrow. Molars laminate, their normal cuspidate character obsolescent. . . . M.1 with five roots." The character of the fur certainly cannot be taken very seriously when one takes into account that species of *Rattus* may be spiny as *Acomys*, or soft as a Chinchilla. The molars have the cusps wearing down early to a laminate pattern, but this occurs in many specialized species of *Rattus*, if a little later perhaps. From young specimens seen it appears that the dentition is normally cusped originally. The bullae are strongly reduced (about 13 per cent of occipitonasal length). T.9 in M.1 and M.2 is small, projecting forwards, and T.8 is broadened. M.3 is considerably reduced.

Head and body 136–160 mm. The tail appears almost devoid of hair.

Congo, Cameroons.

The majority of the remainder of the African groups of *Rattus* are smaller than is usual in the genus, and decidedly more generalized than the Indo-Malayan smaller forms.

32. *tullbergi* group. (Subgenus *Praomys*.) Thomas's characters for this "genus" were: "Size medium. Form slender. Fur soft, without longer bristles. Tail long, very finely haired, not pencilled. Foot not broadened for climbing. Mammae 1—2=6. Skull slender, rostrum long, braincase of normal proportions, the crests either absent, or very slightly developed, cuneate. Zygomatic plate projected forwards, its anterior edge straight or convex. Bullae of average size. Molars narrow, rather elongate, M.2 longer than broad, M.1 with three roots."

The molars are originally moderately cusped, later becoming simple, and do not appear to be very different from the type found in *Rattus concolor*. M.3 is rather strongly reduced. None of the above-mentioned characters is of the slightest value for generic purposes.

Head and body 100–135 mm. The toothrow is rather short; D.5 hindfoot relatively long. Tail normally very poorly haired; longer than head and body.

Liberia, Nigeria, Congo, Kenya, Tanganyika, Uganda, Nyasaland.

Closely allied to the above is

33. *aeta* group. (Subgenus *Hylomyscus*.) This group was given generic rank by Thomas on account of the fact that the feet are supposed to be broadened for climbing, though there seems very little difference between the feet of this group and the last, and that the zygomatic plate is straight anteriorly. The size is sometimes, for the genus, very small (85–120 head and body). Bullae about 16–18 per cent of occipitonasal length. In the species *aeta*, supraorbital ridges are developed; in the others, they are absent. The braincase is broad. M.1 is three-rooted. *R. alleni* has the incisors inclined to be pro-odont. The molars are narrow, *Rattus*-like, moderately cusped originally, but ultimately, so far as seen, becoming quite simple.

Regarding the hindfeet, it may be noted that on average they are in this group 18–21 per cent of the head and body length; exactly the same measurement percentage is found in the *verreauxi* group, below; while *tullbergi* works out at about 21 per cent; this indicates that the supposed differences in the hindfeet of these groups are not very clear; and in St. Leger's key, in which the present group is put among the Tree or Climbing Rats, with "feet short, broadened for climbing," as against the *tullbergi* and *verreauxi* groups, which are regarded as Terrestrial Rats, "feet normal, not broadened for climbing"; in "*Praomys*" and some species of "*Myomys*" the hindfoot has the fifth digit "very nearly as long as in the Tree-Rats," which are said to have the fifth digit "almost as long as the second digit."

The group is closely allied to the *tullbergi* group. Tail long, not very well haired; D.5 hindfoot relatively long. To this group are referred the species *aeta*, *stella*, *denniae*, *carillus*, and *alleni*. Allen lists *carillus* as a subspecies of *alleni*; but the less pro-odont incisors of *carillus* compared with the type of *alleni* suggest that this is not correct.

Liberia, Cameroons, Congo, Uganda, Kenya, Sudan. Mammary formula 2—2=8, or 1—2=6.

34. *verreauxi* group. (Subgenus *Myomys*.) This group has not yet been given a formal genus diagnosis, so far as I can trace, but has simply been given generic rank on the single character mammae 3—2=10, which is not unknown elsewhere in *Rattus*, and is certainly not a generic character. It is not an easy group to classify. One of the species, *daltoni*, suggests the *Mus* type of dentition, though nothing like so extreme as the common African groups of *Mus* (*bellus*, *tenellus*, *triton*, etc.).

There is usually a tendency in the other species for the molars to be broad, rather angular, and well cuspidate; this most marked in forms like *shortridgei*, and perhaps *brockmani*. M.3 may be moderately to strongly reduced. There are no supraorbital ridges, as a rule. The zygomatic plate is slightly cut back above. In *colonus*, the posterior nares are narrowed, as is often the case in the *coucha* group. Shortridge has suggested that *colonus* may be based on a multimammate Rat. Bullae about 15–17 per cent of occipitonasal length. Size rather small: 100–184 head and body. The tail is usually longer than head and body, except in *shortridgei* and *angolensis*; often much longer; rather well haired. D.5 hindfoot usually relatively long.

To the present group have been referred *albipes* from Abyssinia, *brockmani* from Somaliland, *fumatus* from Kenya, *daltoni* from West Africa, *angolensis* from Angola, *shortridgei* from South-west Africa, and *verreauxi* from Capetown. The group is closely allied to the *coucha* Rats, and also to *tullbergi*, from which it is doubtfully subgenerically separable.

In my view the name *Praomys*, being the earliest, would cover all these small African *Rattus*, except perhaps the multimammate group.

35. *coucha* group. (Subgenus *Mastomys*.) Multimammate Rats. Mammae usually more than 12, not separated into pectoral and inguinal sets,

apparently variable, and up to 24. The supraorbital ridges are as a rule scarcely traceable. Incisive foramina long, usually penetrating between molars. Posterior nares very generally narrowed. Bullae variable in size, but never large, often rather strongly reduced. M.3 is moderately or strongly reduced. The molars are as a rule well cusped, and may be reminiscent of the *Mus* type; the present group may be one of the primitive lines that may have given rise to *Mus* on one hand, or part of *Rattus* on the other. Head and body 82–152 mm. The tail is moderately haired; the digits normal.

The classification of G. M. Allen is followed in this group, in my list of named forms; the majority of forms being referred to *coucha* as races. In this group has been also included the rare and very distinct pygmy form *R. pernanus* (head and body 76 mm., tail 65, hindfoot 15).

The range of the group is Morocco, Gambia, Gold Coast, Nigeria, Sudan, Abyssinia, Kenya, Uganda, Tanganyika, South-west Africa, and South Africa.

36. *defua* group. (Subgenus *Dephomys*.) This species was given generic rank by Thomas on the following characters: "Size medium; fur with some bristle-hairs intermixed; . . . feet broad; tail long, very thinly haired, not tufted. Mammae 0—2=4. Skull with large braincase, the crests with tendency to be amphoral; zygomatic plate projecting forward, though less so than in *Aethomys*. Palatal foramina fairly long, but not penetrating between molars. Choanae widely open. Bullae small. Molars cuspidate, a distinct anteroexternal cusplet on M.1 and M.2. M.1 with four roots."

None of these characters appears to distinguish the species from other species of *Rattus* sufficiently for it to be regarded as a genus. The bullae are about 13 per cent of occipitonasal length. Hindfoot relatively broad, of arboreal type; D.5 relatively long; tail quite well haired, much longer than head and body. M.3 is little reduced, and with three laminae traceable. The molars are quite angular, but not more so than in many *Rattus*. T.3 in M.1 is becoming strongly reduced, and T.1 is distorted inwards to a degree. The terminal heel of M.1 and M.2 lower is large, and the outer subsidiary cusps on the lower molars are strongly developed.

One species: *defua*. Liberia, Sierra Leone, Gold Coast.

37. *granti* group. Supraorbital ridges very weak. Zygomatic plate cut back above. Bullae moderate, about 17 per cent of occipitonasal length. Molars extremely complex and angular, quite unlike any other *Rattus* examined. M.2 broader than long; molars very broad in appearance, and heavy; M.1 with T.1, T.2, and T.3 all well developed; on the second lamina, which is broader, T.4 and T.6 point sharply outwards respectively from T.5; T.8 broadened, T.9 medium. M.2 with a large T.1, the centre lamina as in M.1, but even more exaggerated; T.8 broad, and T.9 strongly projecting outwards. M.3 very nearly as large as M.2; with T.3; the centre lamina broad, and bent backwards each side, overlapping the last lamina which is composed of two cusps. M.1 four-rooted.

The whole effect extremely exaggerated, and the pattern evidently persisting till old age. Lower molars with quite strong subsidiary cusps, the terminal heel of M.1 and M.2 suppressed or vestigial. Tail little longer than head and body, relatively well haired (more so than the other small Rats of the area apparently), plantar pads 6; digits normal; head and body about 108–116 mm. This species has been lumped in *Myomys*. It is so aberrant dentally that I do not think it is a *Rattus* at all, and it may later be given generic rank. For the present, on account of its generalized external characters, I retain it in *Rattus*, though the molars

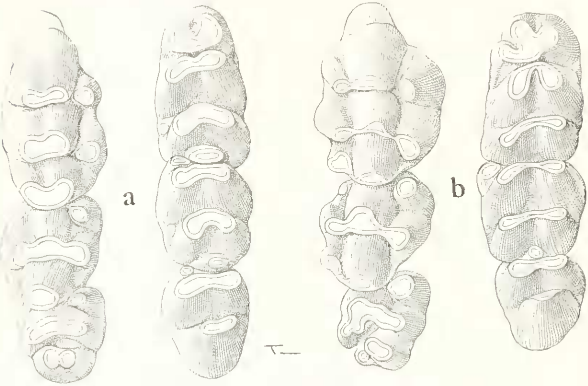

FIG. 13. (*a*) RATTUS RATTUS RATTUS, Linnaeus, B.M. No. 2.9.1.73, ♀; × 10.
(*b*) RATTUS GRANTI, Wroughton, B.M. 2.9.1.83, ♂; × 13.

seem much too complex, and propose for it the new subgeneric name MICAËLAMYS (named after a character in the opera "Carmen"). Some measurements of the teeth are shown below.

TOOTHROW	LENGTH M.1	BREADTH M.1	LENGTH M.2	BREADTH M.2
4·9	2·1	1·8	1·5	1·7
5·1	2·1	1·8	1·4	1·7
4·6	2·1	1·7	1·4	1·6
5·1	2·1	1·8	1·4	1·7
5·1	2·2	1·8	1·4	1·7
5	2·1	1·8	1·4	1·7
5·2	2·1	1·8	1·5	1·6

It will be seen that M.3 can be a little longer than M.2 here; but it is constantly narrower than this tooth.

Mammae 3—2 = 10. *R. granti*, South Africa.

38. *woosnami* group. (Subgenus *Ochromys.*) This species is, I think, probably not a *Rattus*, but it has not got sufficient characters to be regarded as a full genus. It might be described as essentially like *Zelotomys* on cranial and dental characters, but without pro-odont incisors. The tail is white, but this character, I think, is not of generic value, though there may be some who disagree. Skull with little interorbital constriction; braincase relatively narrow; supraorbital ridges not developed. Rostrum rather short. Zygomatic plate nearly straight anteriorly. Palatal foramina long, penetrating between molars. Bullae of medium size. Cheekteeth moderately broad; pattern like that of *Zelotomys* if less extreme; M.1 a little over half the toothrow (but this character is not unknown in *Rattus*, as, for example, *lepturus*); M.3 strongly reduced. M.3 lower also strongly reduced. Tail considerably shorter than head and body, coloured white, moderately haired; digits normal. Mammae 3—2 = 10. According to Shortridge, the eyes are smaller than in other South African Murinae. It is certainly an isolated and aberrant type, more different from *Rattus* than are any of the other subgenera referred here to the genus except *Micaëlamys*. M.1 is three-rooted.

South-west Africa. *R. woosnami*.

Forms seen: *aemuli*, "*aequicaudalis*," *aeta*, *albigularis*, *albipes*, *alexandrinus*, *alleni*, *alticola*, *andamanensis*, *andersoni*, *angolensis*, *annandalei*, *aoris*, *arboreus*, *arfakiensis*, *argentiventer*, *arrogans*, *asper*, *assimilis*, "*ater*," *australis*, *austrinus*, *avunculus*, *azrek*, *baeodon*, *bagopus*, *baluensis*, *bandahara*, *bandiculus*, *bartelsi*, *berdmorei*, *bhotia*, *blainei*, *blanfordi*, *bontanus*, *bowersi*, *bradfieldi*, *brama*, *brevicaudatus*, *brockmani*, *browni*, *brunneus*, *brunneusculus*, *bukit*, *butangensis*, *butleri*, *callitrichus*, *campus*, *canorus*, *caraco*, *carillus*, *celebensis*, *champa*, *changensis*, *chihliensis*, *ciliatus*, *coelestis*, *coenorum*, *colletti*, *colonus*, *conatus*, *concolor*, *confucianus*, *coniger*, *connectens*, *coracius*, *coucha*, *coxingi*, *cremoriventer*, *cretaceiventer*, *culmorum*, *culturatus*, *cuninghamei*, *cutchicus*, *daltoni*, *dammermanni*, *defua*, *delectorum*, *denniae*, *diardi*, *dominator*, *eclipsis*, *edwardsi*, *effectus*, *eha*, *ephippium*, *erythroleucus*, *evelyni*, *everetti*, *excelsior*, *exulans*, *feae*, *feliceus*, *ferreocanus*, *finis*, *firmus*, *flavidulus*, *flavigrandis*, *flavipectus*, *foederis*, *fraternus*, *fratrorum*, *frugivorus*, *fulvescens*, *fuscipes*, "*fuscus*," *gambianus*, *gangutrianus*, *garonum*, *germaini*, *gestri*, *girensis*, *glauerti*, *grandis*, *granti*, *greyi*, *griseipectus*, *griseiventer*, *hawaiensis*, *hellwaldi*, *herberti*, *hildebrandti*, *huang*, *huberti*, "*huegeli*," *humiliatus*, *hylomyoides*, *inas*, "*indicus*," *inflatus*, *infraluteus*, *ismailae*, *ituricus*, *jacksoni*, *jalorensis*, *jarak*, *jerdoni*, *kandianus*, *kelaarti*, *khyensis*, *kina*, *klossi*, *klossi* (*Stenomys*, here renamed *haymani*), *klumensis*, *korinchi*, *kraensis*, *kutensis*, *lancavensis*, *langbianus*, *latouchei*, *legatus*, *leonis*, *lepcha*, *lepturus*, *leucopus*, "*leucosternum*," *ling*, *lingensis*, *listeri*, *longicaudatus*, *losea*, *luticola*, *lutreolus*, *luzonicus*, *mackenziei*, *macleari*, *macmillani*, *macrolepsis*, *magnus*, *makensis*, *manicatus*, *manipulus*, *manuselae*, "*maorium*," *marinus*, *mariquensis*, *marmosurus*, "*maurus*," *mayapahit*, *medius*, *mekongis*, *melvilleus*, *mentosus*, "*microdon*" (=*binominatus*), "*microdon*" (=*coucha*), *milletti*, *mindanensis*, *mindorensis*, *moi*, *molliculus*, *mondraineus*, *montanus*, *montis*, *mordax*, *morio*, *mülleri*, *mullulus*, *murrayi*, *musschenbroekii*, *narbadae*, *nativittatus*, *neglectus, negrinus, nemoralis, ninus, niobe, nitidus, niveiventer, "niveiventris" (= fumatus), norvegicus, obsoletus, ochraceiventer, ohiensis, orbus, pallidus, pan, panglima, pannosus, pelagius, pellax, pemangilis, peregrinus, perlutus, pernanus, pesticulus, poenitentiari, portus, praetor, profusus, "pyctoris," rajah, rajput, rangensis, rapit, ratticolor, rattoides, rattus, ravus, remotus, revertens, rhionis, ringens, rogersi, rubricosa, rufescens, rufulus, rumpia, sabanus, sacer, satarae, "saturatus"* (here renamed *ingoldbyi*), *schoutedeni, "sebastianus," setiger, shortridgei, sikkimensis, similis, siporanus, siva, somereni, sordidus, spurcus, stragulum, stridens, surdus, surifer, tanezumi, tatkonensis, temmincki, tenaster, tenebrosus, tersus, "tetragonurus," tikos, tiomanicus, tistae, todayensis, tramitius, treubi, tullbergi, tunneyi, turkestanicus, ugandae, ululans, utakwa, validus, vallesius, vellerosus, velutinus, verecundus, verreauxi, viator, vicerex, villosissimus, villosus, vociferans, vulcani, wellsi, whiteheadi, woodwardi, woosnami, wroughtoni, xanthurus, youngi, zuluensis.*

List of Named Forms[1]

(The races are listed as far as possible geographically.)

Subgenus *Rattus*, Fischer

baluensis Group

1. RATTUS BALUENSIS BALUENSIS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 454.
Kina Balu, Borneo.

2. RATTUS BALUENSIS KORINCHI, Robinson & Kloss

1916. Journ. Str. Branch Roy. Asiat. Soc. 73, p. 275.
Korinchi Peak, W. Sumatra.

macleari Group

3. RATTUS MACLEARI, Thomas

1887. Proc. Zool. Soc. London, p. 513.
Christmas Island, south of Java.

nativittatus Group

4. RATTUS NATIVITTATUS, Thomas

1888. Proc. Zool. Soc. London, p. 533.
Christmas Island, south of Java.

blanfordi Group

5. RATTUS BLANFORDI, Thomas

1881. Ann. Mag. Nat. Hist. VII, p. 24.
Kadapa, Madras, India.

cutchicus Group

6. RATTUS CUTCHICUS, Wroughton

1912. Journ. Bombay Nat. Hist. Soc. XXI, p. 340.
Cutch, India.

[1] For further notes on the arrangement of these forms see p. 644.

7. RATTUS MEDIUS MEDIUS, Thomas

1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 240.
Kudia, Junagadh, India. (Kathiawar district.)

8. RATTUS MEDIUS RAJPUT, Thomas

1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 241.
Mt. Abu, Rajputana.

9. RATTUS MEDIUS CAENOSUS, Thomas

1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 241.
Singar, Gaya, Bihar and Orissa, India.

10. RATTUS AUSTRALIS AUSTRALIS, Thomas

1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 242.
Vijayanagar, Bellary, India.

11. RATTUS AUSTRALIS SIVA, Thomas

1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 242.
Sivasamudram, S. Mysore, India.

canus Group

12. RATTUS CANUS CANUS, Miller

1903. Proc. U.S. Nat. Mus. XXVI, p. 466.
Pulau Tuangku, N.-W. Sumatra

13. RATTUS CANUS MALAISIA, Kloss

1931. Bull. Raffles. Mus. 5, p. 105.
Kuala Lumpur, Selangor, Malay Peninsula.

14. RATTUS LEGATUS, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 88.
Liukiu Islands.
Synonym: *bowersi okinavensis*, Namiya, 1909, Dobuts. Z. Tokyo, 21, p. 452. Okinawa Island, China Sea. Status *fide* Aoki.

rattus Group

15. RATTUS TANEZUMI, Temminck

1843. Fauna Japonica, p. 51, pl. xv, fig. 5–7.
Japan.

16. RATTUS LOSEA, Swinhoe

1870. Proc. Zool. Soc. London, p. 637.
Formosa.

17. RATTUS FLAVIPECTUS FLAVIPECTUS, Milne-Edwards

1871. Nouv. Archiv. Mus. Bull. 7, p. 93.
Eastern Tibet.

18. RATTUS FLAVIPECTUS YUNNANENSIS, Anderson

1879. Zool. Yunnan, p. 306.
W. Yunnan.

19. RATTUS FLAVIPECTUS MOLLICULUS, Robinson & Kloss

1922. Ann. Mag. Nat. Hist. 9, IX, p. 97.
Daban, Phanrang Province, S. Annam.

20. RATTUS TURKESTANICUS, Satunin

1903. Ann. Mus. St. Petersb. VII, p. 588.
Assam-bob, Turkestan (Ferghana).

21. RATTUS VICEREX, Bonhote

1903. Ann. Mag. Nat. Hist. 7, XI, p. 473.
Simla, N. India.

22. RATTUS RATTOIDES, Hodgson

1845. Ann. Mag. Nat. Hist. XV, p. 267.
Nepal.

23. RATTUS RATTUS RATTUS, Linnaeus

1758. Syst. Nat. 10th ed., p. 61.
Upsala, Sweden.
Synonym: *latipes*, Bennett, 1835, Proc. Zool. Soc. London, p. 89. Asia Minor.
insularis, Waterhouse, 1838, Zool. Beagle, p. 35. Asia Minor.
tompsoni, Ramsay, 1881, Proc. Linn. Soc. New S. Wales, VI, p. 763. New South Wales.
personatus, Krefft, 1867, Proc. Zool. Soc. London, p. 318. Cape York, Queensland.
ater, Millais, 1905, Zoologist, 4, IX, p. 205. Great Britain. Not of Fitzinger.
arboricola, Gould, 1863, Mamm. Australia, p. 35. Australia.
caerulus, Lesson, 1842, Tabl. Regn. Anim. W. Asia.
chionogaster, Lönnberg, K. Svenska. Vet. Akad. Handl. Stockholm, 52, 2, p. 6, 1915. Australia.
samharensis, Heuglin, 1877, Reise N. Ost. Afr. II, p. 67. Eritrea
aequicaudalis, Hodgson, Ann. Mag. Nat. Hist. 1849, 2, III, p. 203.
pyctoris, Hodgson, 1845, Ann. Mag. Nat. Hist. XV, p. 267.
(?) *setosus*, Lund, 1841, Afhandl. K. Danske Vid. Selsk, VIII, pp. 49, 98. America.
(?) *jacobiae*, Waterhouse, 1838, Voy. Beagle, p. 35. James Island, Galapagos.
doriae, Trouessart, 1897, Cat. Mamm. I, p. 472. New Guinea. New name for *beccarii*, Peters.
beccarii, Peters & Doria, 1881, Ann. Mus. Genova, 16, p. 700. New Guinea. Not of Jentink.
fuliginosus, Bonaparte, 1833, Ic. Faun. Ital. 1, fasc. 3, pl. 22, fig. 1. Italy.
subcaerulus, Lesson, Nouv. Tabl. Regn. Anim, p. 138, 1842. France.
domesticus, Fitzinger, 1867, Sitz. Ber. kais. Akad. Wiss. Wien. Math. Nat. Cl. lvi, 1, p. 64.
fuscus, Fitzinger, same reference.
varius, Fitzinger, same reference.
fulvaster, Fitzinger, same reference.
albus, Fitzinger, same reference, p. 65.
ater, Fitzinger, same reference.
alexandrinorattus, Fatio, 1902, Rev. Suisse Zool. x, p. 402. Switzerland.
galapagoensis, Waterhouse, 1839, Zool. Voy. Beagle, p. 65. Galapagos.

24. RATTUS RATTUS RUTHENUS, Ognev & Stroganov

1936. Abs. Works Zool. Inst. Moscow, State Univ. 3, p. 82.
Former Elminsk subdistrict, Used, of former govt. of Smolensk, Russia.

25. RATTUS RATTUS ALEXANDRINUS, Geoffroy

1803. Cat. Mamm. Mus. Nat. Hist. Paris, p. 192.
Alexandria, Egypt.
Synonym: *asiaticus*, Gray, 1837, Ann. Mag. Nat. Hist. I, p. 585. India.
intermedius, Ninni, 1882, Atti. Inst. Venet. 5, VIII, p. 571. Venice, Italy.
crassipes, Blyth, 1859, Journ. Asiat. Soc. Bengal, p. 295. India.
tamarensis, Higgins & Petterd, 1883, Proc. Roy. Soc. Tasmania, p. 185. Tasmania.
griseocaeruleus, Higgins & Petterd, 1882, Proc. Royal Soc. Tasmania, p. 173. Tasmania.
variabilis, Higgins & Petterd, 1882. Proc. Roy. Soc. Tasmania, p. 174. Tasmania.
novaezelandiae, Buller, 1871, Trans. New Zealand Inst. 3, p. 1, New Zealand.
sylvestris, Pictet, 1841, Mém. Soc. Phys. Hist. Nat. Genève, p. 153. Switzerland.
leucogaster, Pictet, same reference, p. 154.
nemoralis, de Selys-Longchamps, Atti. Del. Sec. Riun. degli Sci. Ital. Torino, p. 247, 1840.
picteti, Schinz, Syn. Mamm. 1845, II, p. 142.
(?) *caledonicus*, Wagner, 1842, Schrebers Säug. Suppl. IV.
tettensis, Peters, Reise nach Mosambique, Säug. 156, 1852.

26. RATTUS RATTUS FRUGIVORUS, Rafinesque

1814. Préc. des Decouv. et. Trav. Somiologiques, p. 13.
Sicily.
Synonym: *tectorum*, Savi, 1825, Nuovo Giorn. de Lett. Pisa, X, p. 74. Italy.
siculae, Lesson, 1827, Man. de Mamm. p. 274.

27. RATTUS RATTUS FLAVIVENTRIS, Brants

1827. Gesl. Muizen, p. 108.
Arabia.

28. RATTUS RATTUS SUEIRENSIS, Cabrera

1921. Bol. R. Soc. Esp. Hist. Nat. 21, p. 159.
Mogador, Morocco.
Synonym: *chionogaster*, Cabrera, Real. Soc. Esp. Hist. Nat. 50, p. 51, 1921. Not of Lönnberg & Mjoberg.

29. RATTUS RATTUS NERICOLA, Cabrera

1921. Mem. Real. Soc. Nat. Hist. Madrid, 50, p. 54.
Saf-Saf, Morocco.

30. RATTUS RATTUS KIJABIUS, Allen

1909. Bull. Amer. Mus. Nat. Hist. XXVI, p. 169.
Kijabe, Kenya.
Synonym: *rattiformis*, Matschie, 1915, S. B. Ges. Nat. Fr. Berlin, p. 98. Usambara, Tanganyika.
jujensis, Lönnberg, 1916, Ark. Zool. 10, no. 12, p. 10. Kenya.
muansae, Matschie, 1911, S. B. Ges. Nat. Fr. Berlin, p. 340. Muansa, Tanganyika.

31. RATTUS RATTUS SHIGARUS, Miller

1913. Proc. Biol. Soc. Washington, XXVI, p. 198.
Shigar, Baltistan, Kashmir.

32. RATTUS RATTUS BRUNNEUS, Hodgson
1845. Ann. Mag. Nat. Hist. XV, p. 266.
Nepal.

33. RATTUS RATTUS BRUNNEUSCULUS, Hodgson
1845. Ann. Mag. Nat. Hist. XV, p. 267.
Nepal.

34. RATTUS RATTUS WROUGHTONI, Hinton
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 384.
Nilgiri Hills, India.

35. RATTUS RATTUS ARBOREUS, Horsfield
1851. Cat. E. Ind. Mus. p. 141.
Bengal, India.

36. RATTUS RATTUS KANDIANUS, Kelaart
1850. Journ. R. As. Soc. Ceylon, II, 5, p. 326.
Newera-Ellia, Rambodde, Ceylon.
Synonym: *tetragonurus*, Kelaart, 1850, Journ. R. As. Soc. Ceylon, 330. Colombo, Ceylon.

37. RATTUS RATTUS RUFESCENS, Gray
1837. Ann. Mag. Nat. Hist. I, p. 585.
W. India.
Synonym: *indicus*, Desmarest, 1822, Des. Mamm. ii, p. 299. Not of Bechstein.
flavescens, Elliot, 1839, Madras Journ. L. S. X, p. 214.
infralineatus, Blyth, 1863, Cat. Mamm. As. Soc. 116, nom. nud.
ceylonus, Kelaart, 1850, Prodr. Fauna Zeylanicae, p. 61.

38. RATTUS RATTUS GANGUTRIANUS, Hinton
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 389.
Rambagh, Naini Tal, N. India.

39. RATTUS RATTUS KHYENSIS, Hinton
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 398.
Chin Hills, Kindat, India.

40. RATTUS RATTUS NARBADAE, Hinton
1918. Journ. Bombay Nat. Hist. Soc. XXVI, p. 77.
Sakot, Hoshangabad, India.

41. RATTUS RATTUS GIRENSIS, Hinton
1918. Journ. Bombay Nat. Hist. Soc. XXVI, p. 83.
Sasan, Junagadh, India.

42. RATTUS RATTUS SATARAE, Hinton
1918. Journ. Bombay Nat. Hist. Soc. XXVI, p. 87.
Ghatmatha, Satar district, India.

43. RATTUS RATTUS NEMORALIS, Blyth
1851. Journ. Asiat. Soc. Bengal, XX, p. 168.
Ceylon.

44. RATTUS RATTUS KELAARTI, Wroughton
1915. Journ. Bombay Nat. Hist. Soc. XXIV, p. 48.
Highlands of Ceylon.

45. RATTUS RATTUS TISTAE, Hinton
1918. Journ. Bombay Nat. Hist. Soc. XXVI, p. 68.
Sikkim.

46. RATTUS RATTUS SIKKIMENSIS, Hinton
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 394.
Pashok, Sikkim.

47. RATTUS RATTUS BHOTIA, Hinton
1918. Journ. Bombay Nat. Hist. Soc. XXVI, 1, p. 72.
Hazimara, Bhutan Douars.

48. RATTUS RATTUS TATKONENSIS, Hinton
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 402.
Tatkon, Kindat, west bank River Chindwin, Burma.

49. RATTUS RATTUS TIKOS, Hinton
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 400.
Tenasserim Town.

50. RATTUS RATTUS ROBUSTULUS, Blyth
1859. Journ. Asiat. Soc. Bengal, XXVIII, p. 294.
Schwegyin, Tenasserim.

51. RATTUS RATTUS SLADENI, Anderson
1879. Zool. Yunnan, p. 305.
W. Yunnan.

52. RATTUS RATTUS EXIGUUS, Howell
1927. Proc. Biol. Soc. Washington, XL, p. 43.
70 miles south-west of Yenpingfu, Fukien, S. China.

53. RATTUS RATTUS HAINANICUS, G. M. Allen
1926. Amer. Mus. Nov. 217, p. 3.
Hainan.

54. RATTUS RATTUS PORTUS, Kloss
1915. Journ. Nat. Hist. Soc. Siam, I, p. 221.
Koh Si Chang, Siam.

55. RATTUS RATTUS POENITENTIARII, Kloss
1915. Journ. Nat. Hist. Soc. Siam, I, p. 222.
Koh Phai, Inner Gulf of Siam.

56. RATTUS RATTUS RANGENSIS, Kloss
1916. Proc. Zool. Soc. London, p. 56.
Koh Rang Island, Siam.

57. RATTUS RATTUS KLUMENSIS, Kloss
1916. Proc. Zool. Soc. London, p. 56.
Koh Klum Island, S.-E. Siam.

58. RATTUS RATTUS MAKENSIS, Kloss
1916. Proc. Zool. Soc. London, p. 56.
Koh Mak Island, S.-E. Siam.

59. RATTUS RATTUS KRAENSIS, Kloss

1916. Proc. Zool. Soc. London, p. 57.
Koh Kra Island, S.-E. Siam.

60. RATTUS RATTUS THAI, Kloss

1917. Journ. Nat. Hist. Soc. Siam, II, p. 286.
Raheng, Central Siam.

61. RATTUS RATTUS LANENSIS, Kloss

1919. Journ. Nat. Hist. Soc. Siam, III, p. 378.
Koh Lan, Inner Gulf of Siam.

62. RATTUS RATTUS KRAMENSIS, Kloss

1919. Journ. Nat. Hist. Soc. Siam, III, p. 379.
Koh Kram, Inner Gulf of Siam.

63. RATTUS RATTUS MESANIS, Kloss

1919. Journ. Nat. Hist. Soc. Siam, III, p. 379.
Koh Mesan Island, near Cape Liant, S.-E. Siam.

64. RATTUS RATTUS KORATENSIS, Kloss

1919. Journ. Nat. Hist. Soc. Siam, III, p. 379.
Lat Bua Kao, E. Siam.

65. RATTUS RATTUS DENTATUS, Miller

1913. Smiths. Misc. Coll. LXI, 21, p. 14.
Hastings Island, Mergui Archipelago.

66. RATTUS RATTUS INSULANUS, Miller

1913. Smiths. Misc. Coll. LXI, 21, p. 14.
Helfer Island, Mergui Archipelago.

67. RATTUS RATTUS EXSUL, Miller

1913. Smiths. Misc. Coll. LXI, 21, p. 15.
James Island, Mergui Archipelago.

68. RATTUS RATTUS FORTUNATUS, Miller

1913. Smiths. Misc. Coll. LXI, 21, p. 15.
Chance Island, Mergui Archipelago.

69. RATTUS RATTUS JALORENSIS, Bonhote

1903. Fasc. Malay Zool. 1, p. 29.
Malacca, Straits Settlements.
Synonym: *roquei*, Sody, 1929, Nat. Tijds. Ned. Ind. 89, p. 163. Java.

70. RATTUS RATTUS PAYANUS, Chasen & Kloss

1931. Bull. Raffles. Mus. 5, p. 79.
Pulau Paya, Straits of Malacca.

71. RATTUS RATTUS RHIONIS, Thomas & Wroughton

1909. Ann. Mag. Nat. Hist. 8, III, p. 441.
Bintang Island, Rhio Archipelago.

72. RATTUS RATTUS BATIN, Robinson

1916. Journ. Fed. Malay States Mus. VII, p. 66.
Mentigi, Pulau Mapor, Rhio Archipelago.

73. RATTUS RATTUS KUNDURIS, Chasen & Kloss

1931. Bull. Raffles. Mus. 5, p. 77.
Kundur Island, Rhio Archipelago.

74. RATTUS RATTUS RUMPIA, Robinson & Kloss
1911. Journ. Fed. Malay States Mus. IV, p. 169.
Pulau Rumpia, Sembilan Islands, off Perak coast, W. Malay Peninsula.

75. RATTUS RATTUS VICLANA, Miller
1913. Smiths. Misc. Coll. LXI, 21, p. 13.
Pulau Lankawi, Malay Peninsula.

76. RATTUS RATTUS MANGALUMIS, Kloss
1931. Bull. Raffles. Mus. 5, p. 88.
Mangalum Island, N.-W. Borneo.

77. RATTUS RATTUS JEMURIS, Chasen & Kloss
1931. Bull. Raffles. Mus. 5, p. 78.
Aroa Islands, Straits of Malacca.

78. RATTUS RATTUS ANDAMANENSIS, Blyth
1860. Journ. As. Soc. Bengal, XXIX, p. 103.
Andaman Islands, Bay of Bengal.

79. RATTUS RATTUS ARGENTIVENTER, Robinson & Kloss
1916. Journ. Straits Branch Roy. Asiatic Soc. no. 73, p. 274.
Pasir Ganting, west coast Sumatra.

80. RATTUS RATTUS PALEMBANG, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 1.
Morcarah Doewa, Palembang, S. Sumatra.

81. RATTUS RATTUS MENTAWI, Chasen & Kloss
1928. Proc. Zool. Soc. London, 1927, p. 831.
Sipora Island, W. Sumatra.

82. RATTUS RATTUS BREVICAUDATUS, Horst & de Raadt
1918. Zool. Med. Leiden, 4, p. 69.
Java.

83. RATTUS RATTUS BALI, Kloss
1922. Treubia, II, 1, p. 123.
Laboean Amok, Bali.

84. RATTUS RATTUS SAMATI, Sody
1923. Natuurh. Maandbl. Maastricht, XXI, p. 159.
Bali.

85. RATTUS RATTUS TURBIDUS, Miller
1913. Smiths. Misc. Coll. LXI, 21, p. 12.
Tanggarung, Dutch S.-E. Borneo.

86. RATTUS RATTUS BANGUEI, Chasen & Kloss
1932. Bull. Raffles. Mus. 6, p. 35.
Banguey Island, N. Borneo.

87. RATTUS RATTUS PAUPER, Miller
1913. Smiths. Misc. Coll. LXI, 21, p. 13.
Sirhassen Island, S. Natuna Islands.

88. RATTUS RATTUS LUXURIOSUS, Chasen
1935. Bull. Raffles. Mus. 10, p. 20.
Natuna Island, Bunguran Island.

89. RATTUS RATTUS SEPTICUS, Sody
1933. Ann. Mag. Nat. Hist. 10, XII, p. 437.
Banda Island, Dutch E. Indies.

90. RATTUS RATTUS SUMBAE, Sody
1930. Zool. Med. Leiden, 13, p. 98.
Sumba Island.

91. RATTUS RATTUS SANTALUM, Sody
1932. Natuurh. Maandbl. Maastricht, XXI, p. 159.
Sumba Island.

92. RATTUS RATTUS MOLUCCARIUS, Sody
1933. Ann. Mag. Nat. Hist. 10, XII, p. 437.
Boeroe, Dutch E. Indies.

93. RATTUS RATTUS DIARDI, Jentink
1879. Notes Leyden Mus. II, p. 13.
W. Java.

94. RATTUS RATTUS NEGLECTUS, Jentink
1879. Notes Leyden Mus. II, p. 14.
Borneo.

95. RATTUS RATTUS DUCIS, Lyon
1911. Proc. U.S. Nat. Mus. XL, p. 99.
Pulau Datau, W. Borneo.

96. RATTUS RATTUS LAMUCOTANUS, Lyon
1911. Proc. U.S. Nat. Mus. XL, p. 100.
Pulau Lamucotan, W. Borneo.

97. RATTUS MONTANUS, Phillips
1932. Ceylon Journ. Sci. Sec. B. XVI, p. 323.
West Haputale, Ohiya, Ceylon.

98. RATTUS NITIDUS, Hodgson
1845. Ann. Mag. Nat. Hist. XV, p. 267.
Simla, N. India.
Synonym: *griseipectus*, Milne-Edwards, 1871, Nouv. Arch. Mus. Bull. 7, p. 93. Tibet; status *fide* Osgood.
horeites, Hodgson, 1845, Ann. Mag. Nat. Hist. XV, p. 268.

99. RATTUS NITIDUS OBSOLETUS, Hinton
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 415.
Chin Hills, Burma.

100. RATTUS MACMILLANI, Hinton
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 409.
Upper Chindwin, Burma.

101. RATTUS GRISEIVENTER GRISEIVENTER, Bonhote
1903. Fasc. Malay Zool. 1, p. 30.
Bidor, S. Perak, Malay Peninsula.

102. RATTUS GRISEIVENTER ANNANDALEI, Bonhote
1903. Fasc. Malay Zool. 1, p. 30.
Sungkei, S. Perak.

103. RATTUS GRISEIVENTER RAHENGIS, Kloss
1918. Journ. Nat. Hist. Soc. Siam, III, p. 74.
Raheng, W. Siam.

104. RATTUS REMOTUS, Robinson & Kloss
1914. Ann. Mag. Nat. Hist. 8, XIII, p. 231.
Koh Samui, N.-E. Malay Peninsula.

105. RATTUS TINGIUS, Miller
1913. Smiths. Misc. Coll. LXI, p. 9.
Pulau Tinggi, east coast Johore, Malay Peninsula.

106. RATTUS FULMINEUS, Miller
1913. Smiths. Misc. Coll. LXI, p. 9.
St. Barbe Island, S. China Sea.

107. RATTUS ROA, Miller
1913. Smiths. Misc. Coll. LXI, p. 10.
Pulau Aor, east coast Johore, Malay Peninsula.

108. RATTUS PANNOSUS, Miller
1900. Proc. Biol. Soc. Washington, XIII, p. 190.
Butang Island (Pulau Adang), west coast Malay Peninsula.

109. RATTUS PANNELLUS, Miller
1913. Smiths. Misc. Coll. LXI, p. 8.
Pulau Rawi, Butang Islands.

110. RATTUS ATRIDORSUM, Miller
1903. Proc. Biol. Soc. Washington, XVI, p. 50.
Barren Islands, Andamans.
Synonym: *atratus*, Miller, 1902, Proc. U.S. Nat. Mus. XXIV, p. 767. preoccupied.

111. RATTUS FLEBILIS, Miller
1902. Proc. U.S. Nat. Mus. XXIV, p. 762.
Henry Lawrence Island, Andamans.

112. RATTUS PALMARUM, Zelebor
1869. Reise der Oesterr. Fregatte Novara. Zool. Th. I, Wirbelth. 1, Säugeth. p. 26.
Nicobar Islands.
Synonym: *novarae*, Fitzinger, 1861, Sitz. Ber. Math. Nat. Cl. Akad. Wiss. XLII, p. 394, nom. nud.

113. RATTUS LUGENS, Miller
1903. Smiths. Misc. Coll. XLV, p. 33.
N. Pagi Island, Sumatra.

114. RATTUS MAERENS, Miller
1911. Proc. Biol. Soc. Washington, XXIV, p. 26.
Nias Island, Sumatra.

115. RATTUS SIMALURENSIS SIMALURENSIS, Miller
1903. Proc. U.S. Nat. Mus. XXVI, p. 458.
Simalur Island, W. Sumatra.

116. RATTUS SIMALURENSIS BABI, Lyon
1916. Proc. U.S. Nat. Mus. LII, p. 447.
Pulau Babi, Sumatra.

117. RATTUS SIMALURENSIS LASIAE, Lyon
1916. Proc. U.S. Nat. Mus. LII, p. 446.
Pulau Lasia, Sumatra.

118. RATTUS BULLATUS, Lyon
1908. Proc. U.S. Nat. Mus. XXXIV, p. 646.
Pulau Rapit, E. coast Sumatra.

119. RATTUS SIANTANICUS, Miller
1900. Proc. Washington Acad. Sci. II, p. 210.
Pulau Siantan, Anamba Islands.

120. RATTUS TIOMANICUS, Miller
1900. Proc. Washington Acad. Sci. II, p. 209.
Tioman Island, S. China Sea.

121. RATTUS TAMBELANICUS, Miller
1900. Proc. Washington Acad. Sci. II, p. 212.
Big Tambelan Island, S. China Sea.

122. RATTUS MARA, Miller
1913. Smiths. Misc. Coll. LXI, p. 10.
Maratua Island, S.-E. Borneo.

123. RATTUS TUA, Miller
1913. Smiths. Misc. Coll. LXI, p. 12.
Maratua Island, S.-E. Borneo.

124. RATTUS JULIANUS, Miller
1903. Smiths. Misc. Coll. XLV, p. 34.
St. Julian Island, Malaya.

125. RATTUS DAMMERMANI, Thomas
1921. Ann. Mag. Nat. Hist. 9, VII, p. 247.
Wadjo, N. Celebes.

126. RATTUS PESTICULUS, Thomas
1921. Ann. Mag. Nat. Hist. 9, VII, p. 248.
Menado, Celebes.

127. RATTUS LAHOLIS, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 2.
S. Celebes.

128. RATTUS MINDANENSIS MINDANENSIS, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 442.
Mount Apo, Mindanao, Philippine Islands.

129. RATTUS MINDANENSIS TABLASI, Taylor
1934. Philippine Land Mamm. p. 439.
Odoingan, Tablas, Philippines.

130. RATTUS ZAMBOANGAE, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 443.
Mindanao, Philippines.

131. RATTUS KELLERI, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 444.
Mindanao, Philippines.

132. RATTUS MAGNIROSTRIS, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 441.
Mindanao, Philippines.

133. RATTUS COLORATUS, Hollister
1913. Proc. U.S. Nat. Mus. XLVI, p. 317.
Basilan, Philippines.

134. RATTUS ROBIGINOSUS, Hollister
1913. Proc. U.S. Nat. Mus. XLVI, p. 318.
Cagayan, Philippines.

135. RATTUS MINDORENSIS, Thomas
1897. Abstr. Proc. Zool. Soc. London, June; Trans. Zool. Soc. XIV, 1898, p. 402.
N. Mindoro, Philippines.

136. RATTUS DOBOENSIS, Beaufort
1911. Abh. Senckenberg. Ges. 34, p. 122.
Dobo Island, Aru Islands.

137. RATTUS MANUSELAE, Thomas
1920. Ann. Mag. Nat. Hist. 9, VI, p. 424.
Mt. Manusela, Ceram.

138. RATTUS GESTRI GESTRI, Thomas
1897. Ann. Mus. Civ. Stor. Nat. Genoa, 2, XVIII, p. 611.
Kapa Kapa, British New Guinea.

139. RATTUS GESTRI VANHEURNI, Sody
1933. Ann. Mag. Nat. Hist. 10, XII, p. 435.
N.-W. New Guinea.

norvegicus Group

140. RATTUS NORVEGICUS NORVEGICUS, Berkenhout
1769. Outlines Nat. Hist. Gt. Britain & Ireland, 1, p. 5.
Great Britain.
Synonym: *decumanus*, Pallas, 1778, Nov. Spec. Quad. Glir. Ord. 91. W. China.
hibernicus, Thompson, 1837, Proc. Zool. Soc. London, p. 52, Ireland.
maurus, Waterhouse, 1839, Zool. Beagle, p. 31. America.
leucosternum, Rüppell, 1842, Mus. Senckenb. III, pp. 108, 116. Eritrea.
maniculatus, Wagner, 1848, Arch. Naturg. XIV, p. 186. Egypt.
(?) *decaryi*, Grandidier, 1934, Bull. Mus. Paris, 2, VI, p. 478. Madagascar.
surmolottus, Severinus, 1779, Tentamen Zool. Hungaricae, p. 73.
hybridus, Bechstein, Pennants Allgem. Uebersicht d. Vierfuss, Thiere, II, p. 713, 1800.
caspius, Oken. Lehrb. Naturg. III, Abth. 2, p. 895, 1816.
decumanoides, Hodgson, Journ. As. Soc. Bengal, X, p. 915. nom. nud. 1841.

141. RATTUS NORVEGICUS PRIMARIUS, Kastschenko
1912. Ann. Mus. St. Petersb. 17, p. 401.
Transbaikalia.

142. RATTUS NORVEGICUS CARACO, Pallas

1778. Nov. Sp. Quad. Glir. Ord. p. 91.
E. Siberia.

143. RATTUS NORVEGICUS SOCER, Miller

1914. Proc. Biol. Soc. Washington, XXVII, p. 90.
Taocheo, Kansu, China.

144. RATTUS NORVEGICUS PRAESTANS, Trouessart

1904. Cat. Mamm. Suppl. p. 546, footnote.
Celebes.
Synonym: *hoffmani*, Trouessart, same reference, p. 365. Not of Matschie.
major, Hoffman, 1887, Abh. Zool. Dresden, p. 18. Preoccupied.

145. RATTUS HUMILIATUS HUMILIATUS, Milne-Edwards

1868. Rech. Mamm. p. 137, pl. 41, fig. 1.
Pekin, China.
Synonym: *plumbeus*, Milne-Edwards, 1874, Rech. Mamm. p. 138, Suen-hoa-fou, W. Tcheli, China.
ouangthomae, Milne-Edwards, 1871, Nouv. Arch. Mus. p. 93, Kiang-si, China.

146. RATTUS HUMILIATUS SOWERBYI, Howell

1928. Proc. Biol. Soc. Washington, XLI, p. 42.
Near Imienpo, N. Kirin, Manchuria.

147. RATTUS HUMILIATUS INSOLATUS, Howell

1927. Proc. Biol. Soc. Washington, XL, p. 44.
12 miles south of Yenanfu, Shensi, China.

148. RATTUS HUMILIATUS CELSUS, G. M. Allen

1926. Amer. Mus. Nov. 217, p. 5.
Taku Ferry, west bank of Yangtsekiang, Yunnan.

149. RATTUS TYRANNUS, Miller

1910. Proc. U.S. Nat. Mus. XXXVIII, p. 397.
Ticao, Philippine Islands.

150. RATTUS BURRUS, Miller

1902. Proc. U.S. Nat. Mus. XXIV, p. 768.
Trinkut Island, Nicobars.

151. RATTUS BURRULUS, Miller

1902. Proc. U.S. Nat. Mus. XXIV, p. 770.
Car Nicobar, Nicobar Islands.

152. RATTUS BURRESCENS, Miller

1902. Proc. U.S. Nat. Mus. XXIV, p. 771.
Great Nicobar Island, Nicobars.

hoffmani Group

153. RATTUS HOFFMANI HOFFMANI, Matschie

1901. Abh. Senckenb. Ges. XXV, p. 284.
Celebes.

154. RATTUS HOFFMANI LINDUENSIS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 70.
Lake Lindoe, Middle Celebes.

155. RATTUS HOFFMANI SUBDITIVUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 70.
Bada, Middle Celebes.

156. RATTUS HOFFMANI MENGKOKA, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 3.
Mengkoka Mountains, S.-E. Celebes.

157. RATTUS MOLLICOMUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 71.
Pinedapa, Middle Celebes.

158. RATTUS MOLLICOMULUS, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 4.
Mountains of S. Celebes.

159. RATTUS PALELAE, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 69.
Pulo Paleleh, north coast of Celebes.

160. RATTUS PULLIVENTER, Miller
1902. Proc. U.S. Nat. Mus. XXIV, p. 765.
Great Nicobar Island, Nicobars.
(Perhaps a member of *rattus* group, but mammae 1—3 = 8, as in *hoffmani* group.)

161. RATTUS ROGERSI, Thomas
1907. Ann. Mag. Nat. Hist. 7, XX, p. 206.
Andaman Islands, Bay of Bengal.
(Mammae 1—3 = 8, as in *hoffmani* group; position doubtful.)

concolor Group

162. RATTUS CONCOLOR CONCOLOR, Blyth
1859. Journ. Asiat. Soc. Bengal, XXVIII, p. 295.
Shwagyin, Burma.

163. RATTUS CONCOLOR EPHIPPIUM, Jentink
1880. Notes Leyden Mus. p. 15.
Sumatra.

164. RATTUS CONCOLOR STRAGULUM, Robinson & Kloss
1916. Journ. Str. Br. Roy. Asiat. Soc. LXXIII, p. 274.
Mount Korinchi, W. Sumatra.

165. RATTUS CONCOLOR CLABATUS, Lyon
1906. Proc. U.S. Nat. Mus. XXXI, p. 596.
Banka Island, Sumatra.

166. RATTUS CONCOLOR EQUILE, Robinson & Kloss
1927. Journ. Fed. Malay States Mus. XIII, p. 209.
Idjen Massif, E. Java.

167. RATTUS CONCOLOR OTTENI, Kopstein
1931. Journ. Morph. Okol. Thiere, 22, p. 783.
Java.

168. RATTUS CONCOLOR BURUENSIS, Allen

1911. Bull. Amer. Mus. Nat. Hist. XXX, p. 336.
Buru Island, Moluccas.

169. RATTUS PULLUS, Miller

1901. Proc. Biol. Soc. Washington, XIV, p. 178.
Tioman Island, Malay Peninsula.
Synonym: *obscurus*, Miller, 1900, Proc. Washington Ac. Sci. II, p. 213, preoccupied.

170. RATTUS SURDUS, Miller

1903. Proc. U.S. Nat. Mus. XXVI, p. 460.
Simalur Island, Sumatra.

171. RATTUS SCHUITEMAKERI, Sody

1933. Ann. Mag. Nat. Hist. 10, XII, p. 431.
Pontianak, W. Borneo.

172. RATTUS RAVENI RAVENI, Miller & Hollister

1921. Proc. Biol. Soc. Washington, XXXIV, p. 69.
Toli Toli, N. Celebes.

173. RATTUS RAVENI EUROUS, Miller & Hollister

1921. Proc. Biol. Soc. Washington, XXXIV, p. 69.
Kwandang, N. Celebes.

174. RATTUS WICHMANNI, Jentink

1890. Weber's Zool. Ergebn. pp. 120, 121.
Flores.

175. RATTUS NEGRINUS, Thomas

1898. Trans. Zool. Soc. London, XIV, p. 403.
Negros, Philippine Islands.

176. RATTUS LUTEIVENTRIS, Allen

1910. Bull. Amer. Mus. Nat. Hist. XXVIII, p. 14.
Palawan, Philippines.

177. RATTUS TODAYENSIS, Mearns

1905. Proc. U.S. Nat. Mus. XXVIII, p. 445.
Mt. Apo, S.-E. Mindanao, Philippines.

178. RATTUS PANTARENSIS, Mearns

1905. Proc. U.S. Nat. Mus. XXVIII, p. 448.
Pantar, Mindanao, Philippines.

179. RATTUS CALCIS, Hollister

1911. Proc. Biol. Soc. Washington, XXIV, p. 89.
Luzon, Philippines.

180. RATTUS QUERCETI, Hollister

1911. Proc. Biol. Soc. Washington, XXIV, p. 90.
Luzon, Philippines.

181. RATTUS MAYONICUS, Hollister

1913. Proc. U.S. Nat. Mus. XLVI, p. 319.
Luzon, Philippines.

182. RATTUS LEUCOPHAETUS, Hollister

1913. Proc. U.S. Nat. Mus. XLVI, p. 320.
Cataduanes Island, Philippines.

183. RATTUS VIGORATUS, Hollister
1913. Proc. U.S. Nat. Mus. XLVI, p. 321.
Mindoro, Philippines.

184. RATTUS BASILANUS, Hollister
1913. Proc. U.S. Nat. Mus. XLVI, p. 322.
Basilan, Philippines.

185. RATTUS ORNATULUS, Hollister
1913. Proc. U.S. Nat. Mus. XLVI, p. 322.
Cagayancillo, Cagayan Island, Philippines.

186. RATTUS VULCANI VULCANI, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 446.
Mt. Apo, Mindanao, Philippines.

187. RATTUS VULCANI APICIS, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 447.
Mt. Apo, Mindanao, Philippines.

188. RATTUS AEMULI, Thomas
1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 249.
Aemuli, Jampea Island, Salayer Group, off Celebes.

189. RATTUS EXULANS EXULANS, Peale
1848. U.S. Explor. Exped. VIII, p. 47.
Fiji Islands.
Synonym: *vitiensis*, Peale, U.S. Explor. Exped. VIII, p. 49, 1848. Fiji.
maorium, Hutton, 1879, Trans. New Zealand Inst. XI, p. 344. New Zealand.
jessook, Jentink, 1879, Notes Leyden Mus. II, p. 15. New Hebrides.
huegeli, Thomas, 1880, Proc. Zool. Soc. London, p. 11. Fiji Islands.

190. RATTUS EXULANS BROWNI, Alston
1877. Proc. Zool. Soc. London, p. 123.
New Ireland.
Synonym: *echimyoides*, Ramsay, 1877, P. Linn. Soc. N.S. Wales, II, p. 15.
concolor lassacquerei, Sody, 1933, Ann. Mag. Nat. Hist. 10, XII, p. 433. New Guinea (*fide* Rümmler).
concolor manoquarius, Sody, 1934, Nat. Tydsch. Ned. Ind. XCIV, p. 175. New Guinea (*fide* Rümmler).

191. RATTUS MICRONESIENSIS, Tokuda
1933. Annot. Zool. Jap. 14, p. 83.
Ponape Island, W. Pacific.

192. RATTUS HAWAIIENSIS, Stone
1917. Occ. Papers Bern. P. Bishop Mus. 3, no. 4, p. 10.
Popoia Island, Oahu, Hawaii Islands.

mülleri Group

193. RATTUS MÜLLERI MÜLLERI, Jentink
1879. Notes Leyden Mus. II, p. 16.
Batang, Singalur, Sumatra.
Synonym: *victor*, Miller, 1913, Smiths. Misc. Coll. LXI, p. 16. Rumpin River, Pahang. Status *fide* Kloss.

194. RATTUS MÜLLERI CAMPUS, Robinson & Kloss

1916. Journ. Str. Br. Roy. Asiat. Soc. p. 275.
W. Sumatra.
Synonym: *virtus*, Lyon, 1916, Proc. Biol. Soc. Washington, XXIX, p. 210. Sumatra.

195. RATTUS MÜLLERI FOEDERIS, Robinson & Kloss

1911. Journ. Fed. Malay States Mus. IV, p. 245.
Perak, Malay Peninsula.

196. RATTUS MÜLLERI OTIOSUS, Chasen

1934. Bull. Raffles Mus. Singapore, 9, p. 98.
Balambangan Island, N. Borneo.

197. RATTUS MÜLLERI BORNEANUS, Miller

1913. Smiths. Misc. Coll. LXI, p. 15.
Telok Karang Tigan, Dutch S.-E. Borneo.

198. RATTUS VALIDUS VALIDUS, Miller

1900. Proc. Biol. Soc. Washington, XIII, p. 141.
Trang, Lower Siam.

199. RATTUS VALIDUS TEREMPA, Chasen & Kloss

1928. Journ. Malay Br. Roy. Asiat. Soc. VI, p. 36.
Anamba Islands.

200. RATTUS JARAK, Bonhote

1905. Journ. Fed. Malay States Mus. I, p. 69.
Pulau Jarak, Malacca.

201. RATTUS VILLOSUS, Kloss

1908. Journ. Fed. Malay States Mus. II, p. 146.
Singapore.

202. RATTUS FIRMUS, Miller

1902. Proc. Acad. Nat. Sci. Philadelphia, p. 155.
Linda Island, E. Sumatra.

203. RATTUS DOMITOR, Miller

1903. Proc. U.S. Nat. Mus. XXVI, p. 461.
Pulau Mansalar, W. Sumatra.

204. RATTUS POLLENS, Miller

1913. Smiths. Misc. Coll. LXI, p. 17.
Banka Island, Sumatra.

205. RATTUS POTENS, Miller

1913. Smiths. Misc. Coll. LXI, p. 17.
Pulau Tuangku, W. Sumatra.

206. RATTUS VALENS, Miller

1913. Smiths. Misc. Coll. LXI, p. 18.
Pulau Bangkaru, Banjak Islands.

207. RATTUS BALMASUS, Lyon

1916. Proc. U.S. Nat. Mus. LII, p. 447.
Tana Bala, Batu Islands, Sumatra.

208. RATTUS CHOMBOLIS, Lyon

1909. Proc. U.S. Nat. Mus. XXXVI, p. 484.
Pulau Jombol, Rhio-Lingga Archipelago.

209. RATTUS MAXI, Sody
1932. Natuurh. Maandbl. Maastricht, XXI, p. 157.
Tjiboeni, Bandoeng, W. Java.

210. RATTUS INFRALUTEUS, Thomas
1888. Ann. Mag. Nat. Hist. 6, II, p. 409.
Kina Balu, Borneo.

211. RATTUS CRASSUS, Lyon
1911. Proc. U.S. Nat. Mus. XL, p. 103.
Pulau Lamukotan, W. Borneo.

212. RATTUS SEBUCUS, Lyon
1911. Proc. U.S. Nat. Mus. XL, p. 102.
Pulau Sebuku, south-east coast Borneo.

213. RATTUS INTEGER, Miller
1901. Proc. Washington Acad. Sci. III, p. 119.
Sirhassen, Natuna Islands.

xanthurus Group

214. RATTUS DOMINATOR DOMINATOR, Thomas
1921. Ann. Mag. Nat. Hist. 9, VII, p. 244.
Mt. Masarang, Minahassa, N. Celebes.

215. RATTUS DOMINATOR CAMURUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 96.
Pinedapa, Middle Celebes.

216. RATTUS XANTHURUS, Gray
1867. Proc. Zool. Soc. London, p. 598.
Celebes.

217. RATTUS CALLITRICHUS, Jentink
1878. Notes Leyden Mus. p. 12.
Menado, N. Celebes.

218. RATTUS MARMOSURUS, Thomas
1921. Ann. Mag. Nat. Hist. 9, VII, p. 246.
Mt. Masarang, Minahassa, N. Celebes.

219. RATTUS FACETUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 96.
South-west of Lake Lindoe, Middle Celebes.

220. RATTUS HAMATUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 97.
South-west of Lake Lindoe, Middle Celebes.

221. RATTUS TAERAE, Sody
1932. Natuurh. Maandbl. Maastricht. XXI, p. 158.
Lembean, east of Tondano, N. Celebes.

222. RATTUS TONDANUS, Sody
1932. Natuurh. Maandbl. Maastricht. 21, p. 158.
Tondano, N. Celebes.

223. RATTUS ARCUATUS, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 9.
Mengkoka Mountains, Celebes.

224. RATTUS SALOCCO, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 7.
Mengkoka Mountains, Celebes.

225. RATTUS MICROBULLATUS, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 8.
Mengkoka Mountains, Celebes.

226. RATTUS PUNICANS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 98.
Pinedapa, Middle Celebes.

227. RATTUS CELEBENSIS, Gray
1867. Proc. Zool. Soc. London, p. 598.
Menado, N. Celebes.

228. RATTUS BONTANUS, Thomas
1921. Ann. Mag. Nat. Hist. 9. VII, p. 245.
Mt. Lampobatang, S. Celebes.
Synonym: (?) *orientalis*, Revilliod, 1911, Zool. Anz. 37, p. 513. Preoccupied.

229. RATTUS TAGULAYENSIS, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 439.
Mindanao, Philippine Islands.

230. RATTUS ALBIGULARIS, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 440.
Mindanao, Philippines.

231. RATTUS GALA, Miller
1911. Proc. U.S. Nat. Mus. XXXVIII, p. 398.
Mindoro, Philippines.

232. RATTUS EVERETTI, Günther
1879. Proc. Zool. Soc. London, p. 75.
Mindanao, Philippines.

233. RATTUS LUZONICUS, Thomas
1895. Ann. Mag. Nat. Hist. 6, XVI, p. 163.
Luzon, Philippines.

234. RATTUS BAGOPUS, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 450.
Mindanao, Philippines.

chrysocomus Group

235. RATTUS CHRYSOCOMUS, Hoffman
1887. Abh. Mus. Dresden, III, p. 20.
Celebes.

236. RATTUS FRATRORUM, Thomas
1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 246.
Rurukan, Celebes.

237. RATTUS ANDREWSI, Allen
1911. Bull. Amer. Mus. Nat. Hist. XXX, p. 336.
Buton Island, Celebes.

238. RATTUS ADSPERSUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 71.
Pinedapa, Middle Celebes.

239. RATTUS PENITUS PENITUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 72.
Lake Lindoe, Middle Celebes.

240. RATTUS PENITUS INFERIOR, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 6.
Mengkoka Mountains, S.-E. Celebes.

241. RATTUS PENITUS HEINRICHI, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 6.
Lampobatang, S. Celebes.

242. RATTUS PENITUS SERICATUS, Miller
1921. Proc. Biol. Soc. Washington, XXXIV, p. 73.
Rano Rano, Middle Celebes.

243. RATTUS RALLUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 73.
Gimpoe, Middle Celebes.

244. RATTUS BREVIMOLARIS, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 7.
Lalolis, south-east of Mengkoka Mountains, S.-E. Celebes.

245. RATTUS NIGELLUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 72.
Near Toboli, N. Middle Celebes.

cœlestis Group

246. RATTUS CŒLESTIS CŒLESTIS, Thomas
1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 248.
Bonthian Peak, S. Celebes.

247. RATTUS CŒLESTIS KOKA, Tate & Archbold
1935. Amer. Mus. Nov. 803, p. 1.
Mengkoka Mountains, S.-E. Celebes.

confucianus-huang Group

(The position of the first species and its allies, *andersoni*, is uncertain.)

248. RATTUS ANDERSONI ANDERSONI, Thomas
1911. Abstr. Proc. Zool. Soc. London, p. 4; Proc. Zool. Soc. London, p. 171.
Omi-san, Szechuan, China.

249. RATTUS ANDERSONI ZAPPEYI, Allen
1912. Bull. Mus. Comp. Zool. Harvard Coll. XL, p. 225.
Washan Mountains, W. Szechuan.

250. RATTUS EXCELSIOR, Thomas
1911. Abstr. Proc. Zool. Soc. London, p. 4; Proc. Zool. Soc. London, p. 170.
Ta-tsien-lu, W. China.

251. RATTUS CULTURATUS, Thomas
1917. Ann. Mag. Nat. Hist. 8, XX, p. 198.
Mount Arizan, Formosa.

(typical section)

252. RATTUS CONFUCIANUS CONFUCIANUS, Milne-Edwards

1871. Nouv. Archiv. Mus. Nat. Hist. VII, Bull. p. 93.
Tibet.

253. RATTUS CONFUCIANUS SACER, Thomas

1908. Proc. Zool. Soc. London, p. 6.
Shantung Peninsula, China.

254. RATTUS CONFUCIANUS CHIHLIENSIS, Thomas

1917. Ann. Mag. Nat. Hist. 8, XX, p. 199.
Imperial Tombs, Pekin.

255. RATTUS CONFUCIANUS LUTICOLOR, Thomas

1908. Abstr. Proc. Zool. Soc. London, p. 45; Proc. Zool. Soc. London, p. 972.
Yen-an-fu, Shensi, N. China.

256. RATTUS CONFUCIANUS SINIANUS, Shih

1931. Bull. Dept. Biol. Sun Yat-sen Univ. no. 12, p. 3.
Kwantung, China.

257. RATTUS CONFUCIANUS CANORUS, Thomas

1911. Proc. Zool. Soc. London, p. 690.
Wen-hsien country, S. Kansu, China.

258. RATTUS CONFUCIANUS YAOSHANENSIS, Shih

1930. Bull. Dept. Biol. Sun Yat-sen Univ. no. 4, p. 6.
Kwangsi, China.

259. RATTUS CONFUCIANUS LITTOREUS, Cabrera

1923. Bol. Soc. Esp. Hist. Nat. 22, p. 167.
Foochow, China.

260. RATTUS CONFUCIANUS LOTIPES, G. M. Allen

1926. Amer. Mus. Nov. 217, p. 11.
Hainan.

261. RATTUS WONGI, Shih

1931. Bull. Dept. Biol. Sun Yat-sen Univ. 12, p. 6.
Fongtung, Kwantung China.

262. RATTUS ELEGANS, Shih

1931. Bull. Dept. Biol. Sun Yat-sen Univ. 12, p. 7.
Fongtung, Kwantung, China.

263. RATTUS RUBRICOSA, Anderson

1878. Anat. Zool. Res. Yunnan, p. 306.
Yunnan.

264. RATTUS NIVEIVENTER, Hodgson

1836. Journ. Asiat. Soc. Bengal, V, p. 234.
Central region of Nepal.

265. RATTUS LING, Bonhote

1906. Proc. Zool. Soc. London, 2, p. 388.
Ching Feng Ling, N.-W. Fokien, S. China.
Synonym: *minor*, Shih, Bull. Dept. Biol. Sun Yat-sen Univ. 8, 2, 1930.

266. RATTUS HUANG, Bonhote

1905. Proc. Zool. Soc. London, p. 387.
Kuatun, China.
Synonym: *flavipilis*, Shih, Bull. Dept. Biol. Sun Yat-sen Univ. 8, 2, 1930.

267. RATTUS FULVESCENS FULVESCENS, Gray

1846. Cat. Hodgson Coll. p. 18.
Nepal.
Synonym: *huang vulpicolor*, G. M. Allen, 1926, Amer. Mus. Nov. 217, p. 14. Yunnan-Burma border, Namting River (status *fide* Osgood).
caudatior, Hodgson, 1849, Ann. Mag. Nat. Hist. 2, III, p. 203. Nepal.
jerdoni, Blyth, 1863, Journ. Asiat. Soc. Bengal, XXXII, p. 350. Sikkim.
octomammis, Gray, 1863, Cat. Hodgson Coll. Ind. ed. p. 10.

268. RATTUS FULVESCENS TREUBII, Robinson & Kloss

1919. Ann. Mag. Nat. Hist. 9, IV, p. 376.
W. Java.

269. RATTUS FULVESCENS TEMMINCKI, Kloss

1921. Journ. Fed. Malay States Mus. X, p. 233.
Besoeki, E. Java.

270. RATTUS FULVESCENS OSIMENSIS, Abe

1935. Journ. Sci. Hiroshima Univ. 3, p. 107.
Amamiosima Island, Liukiu Islands.

271. RATTUS FULVESCENS MARINUS, Kloss

1916. Proc. Zool. Soc. London, p. 50.
Koh Chang Island, S.-E. Siam.

272. RATTUS FULVESCENS PAN, Robinson & Kloss

1914. Ann. Mag. Nat. Hist. 8, XIII, p. 229.
Koh Samui, N.-E. Malaya.

273 RATTUS FULVESCENS CHAMPA, Robinson & Kloss

1922. Ann. Mag. Nat. Hist. 9, IX, p. 96.
Langbian Peaks, S. Annam.

274. RATTUS FULVESCENS BATURUS, Sody

1932. Nat. Tijd. Ned. Ind. XCII, p. 334.
Gunong Agong, E. Bali.

275. RATTUS FULVESCENS LEPTUROIDES, Sody

1934. Nat. Tijd. Ned. Ind. XCIV, p. 174.
Gunung Lawu, Mid Java.

276. RATTUS FULVESCENS BUKIT, Bonhote

1903. Ann. Mag. Nat. Hist. 7, XI, p. 125.
Bukit Besar, Jalor, Malay Peninsula.

277. RATTUS FULVESCENS CONDORENSIS, Chasen & Kloss

1926. Journ. Siam Soc. Nat. Hist. Suppl. VI, 4, p. 358.
Pulau Condore, south-east coast Cochin China.

278. RATTUS OHIENSIS, Phillips
1929. Ceylon Journ. Sci. Sec. B. XV, p. 167.
W. Haputale, Ohiya, Ceylon.

279. RATTUS ALTICOLA, Thomas
1888. Ann. Mag. Nat. Hist. 6, II, p. 408.
Kina Balu, Borneo.

280. RATTUS OCHRACEIVENTER, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 451.
Kina Balu, Borneo.

281. RATTUS BRAMA, Thomas
1914. Journ. Bombay Nat. Hist. Soc. XXIII, p. 232.
Mishmi Hills, Assam.

282. RATTUS MENTOSUS, Thomas
1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 643.
Hkampti, Upper Chindwin, Burma.

283. RATTUS LEPIDUS, Miller
1913. Smiths. Misc. Coll. LXI, p. 20.
Bok Pyin, S. Tenasserim.

284. RATTUS GRACILIS, Miller
1913. Smiths. Misc. Coll. LXI, p. 21.
Mt. Mooleyit, N. Tenasserim.

285. RATTUS INDOSINICUS, Osgood
1932. Field. Mus. Nat. Hist. Zool. ser. XVIII, p. 307.
Chapa, Tongking.

286. RATTUS BATAMANUS, Lyon
1907. Proc. U.S. Nat. Mus. XXXI, p. 654.
Batum Island, Rhio Archipelago.

287. RATTUS MANDUS, Lyon
1908. Proc. U.S. Nat. Mus. XXXIV, p. 644.
Sungei Mandau, E. Sumatra.

288. RATTUS BARUSSANUS, Miller
1911. Proc. Biol. Soc. Washington, XXIV, p. 26.
Nias Island, Sumatra.

289. RATTUS HYLOMYOIDES, Robinson & Kloss
1916. Journ. Str. Br. Roy. Asiat. Soc. LXXIII, p. 273.
Korinchi Peak, W. Sumatra.

290. RATTUS SPATULATUS, Lyon
1911. Proc. U.S. Nat. Mus. XL, p. 111.
Pulau Lamukotan, W. Borneo.

291. RATTUS RAPIT, Bonhote
1903. Ann. Mag. Nat. Hist. 7, XI, p. 123.
Kina Balu, Borneo.

292. RATTUS TRACHYNOTUS, Cabrera
1920. Bol. Real. Soc. Esp. Hist. Nat. 20, p. 212.
Kina Balu, Borneo.

293. RATTUS LEPCHA, Wroughton
1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 429.
Sikkim.

musschenbroekii Group

294. RATTUS MUSSCHENBROEKII MUSSCHENBROEKII, Jentink
1878. Notes Leyden Mus. p. 10
Menado, N. Celebes.

295. RATTUS MUSSCHENBROEKII TETRICUS, Miller & Hollister
1921. Proc. Biol. Soc. Washington, XXXIV, p. 68.
Gimpoe, south-west of Lake Lindoe, Middle Celebes.

cremoriventer Group

296. RATTUS CREMORIVENTER CREMORIVENTER, Miller
1900. Proc. Biol. Soc. Washington, XIII, p. 144.
Trang, Lower Siam.

297. RATTUS CREMORIVENTER LANGBIANIS, Robinson & Kloss
1922. Ann. Mag. Nat. Hist. 9, IX, p. 96.
Langbian Peaks, S. Annam.

298. RATTUS CREMORIVENTER CRETACEIVENTER, Robinson & Kloss
1919. Ann. Mag. Nat. Hist. 9, IV, p. 377.
Tjibodas, W. Java.

299. RATTUS CREMORIVENTER MALAWALI, Chasen & Kloss
1932. Bull. Raffles Mus. 6, p. 32.
Mallewalle Island, N. Borneo.

300. RATTUS CREMORIVENTER KINA, Bonhote
1903. Ann. Mag. Nat. Hist. 7, XI, p. 124.
Kina Balu, Borneo.

301. RATTUS CREMORIVENTER TENASTER, Thomas
1916. Ann. Mag. Nat. Hist. 8, XVII, p. 425.
Mt. Mooleyit, Tenasserim.

302. RATTUS BLYTHI BLYTHI, Kloss
1920. Records Indian Mus. 13, p. 8.
Schweygin, Tenasserim.
Synonym: *cinnamomeus*, Blyth, 1859, Journ. Asiat. Soc. Bengal, XXVIII, p. 294.

303. RATTUS BLYTHI MEKONGIS, Robinson & Kloss
1922. Ann. Mag. Nat. Hist. 9, IX, p. 96.
Mekong River, Laos, 18° 53′ N.

304. RATTUS ORBUS ORBUS, Robinson & Kloss
1914. Ann. Mag. Nat. Hist. 8, XIII, p. 228.
Kao Nawng, Bandon, N.-E. Malay Peninsula.

305. RATTUS ORBUS FRATERNUS, Robinson & Kloss
1916. Journ. Str. Br. Roy. Asiat. Soc. LXXIII, p. 273.
Korinchi, W. Sumatra.

306. RATTUS GILBIVENTER, Miller
1903. Smiths. Misc. Coll. XLV, p. 35.
Sullivan Island, Mergui Archipelago.

307. RATTUS SOLUS, Miller
1913. Smiths. Misc. Coll. LXI, p. 22.
Pulau Terutau, west coast Malay Peninsula.

308. RATTUS MENGURUS, Miller
1911. Proc. Biol. Soc. Washington, XXIV, p. 27.
Billiton Island, Sumatra.

309. RATTUS FLAVIVENTER, Miller
1900. Proc. Washington Acad. Sci. II, p. 204.
Anamba Islands.

310. RATTUS BECCARII, Jentink
1879. Notes Leyden Mus. II, p. 11.
Menado, Celebes.
Synonym: *thysanurus*, Sody, 1932, Natuurh. Maandbl. Maastricht, XXI, p. 157. Minahassa, N. Celebes.

whiteheadi Group

311. RATTUS ASPER, Miller
1900. Proc. Biol. Soc. Washington, XIII, p. 145.
Trang, Lower Siam.

312. RATTUS SAKERATENSIS, Gyldenstolpe
1916. K. Svenska. Vet. Akad. Handl. Stockholm, 57, 2, p. 46.
Sakerat, E. Siam.

313. RATTUS KLOSSI, Bonhote
1906. Proc. Zool. Soc. London, p. 9.
Mt. Pulai, S. Johore, Malay Peninsula.

314. RATTUS INAS, Bonhote
1906. Proc. Zool. Soc. London, p. 9.
Gunong Inas, Perak, Malay Peninsula.

315. RATTUS BATUS, Miller
1911. Proc. Biol. Soc. Washington, XXIV, p. 27.
Pulau Pinie, Batu Islands, Sumatra.

316. RATTUS WHITEHEADI WHITEHEADI, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 452.
Kina Balu, Borneo.

317. RATTUS WHITEHEADI PERLUTUS, Thomas
1911. Ann. Mag. Nat. Hist. 8, VII, p. 205.
Balangean, N. Central Sarawak, Borneo.

318. RATTUS MELINOGASTER, Cabrera
1920. Bol. Real. Soc. Esp. Hist. Nat. 20, p. 211.
Bongon, N. Borneo.

319. RATTUS ASPINATUS, Tate & Archbold
1935. Amer. Mus. Nov. 802, p. 9.
N. Celebes.

baeodon Group

320. RATTUS BAEODON, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 452.
Kina Balu, Borneo.

eha Group

321. RATTUS EHA EHA, Wroughton
1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 428.
Sikkim, Himalayas.

322. RATTUS EHA NINUS, Thomas
1922. Ann. Mag. Nat. Hist. 9, X, p. 404.
Kiu-kiang, Salween Divide, 28° N. Yunnan Highlands.

lepturus Group

323. RATTUS LEPTURUS LEPTURUS, Jentink
1879. Notes Leyden Mus. II, p. 17.
Java.

324. RATTUS LEPTURUS FREDERICAE, Sody
1931. Nat. Tijds. Ned. Ind. XCI, p. 212.
W. Java.

325. RATTUS LEPTURUS BESUKI, Sody
1931. Nat. Tijds. Ned. Ind. XCI, p. 214.
E. Java.

326. RATTUS LEPTURUS MACULIPECTUS, Sody
1934. Nat. Tijds. Ned. Ind. XCIV, p. 173.
Gunung Tjereme, W. Java.

bartelsi Group

327. RATTUS BARTELSI, Jentink
1910. Notes Leyden Mus. XXXIII, p. 69.
Mt. Pangerango, Java.
Synonym: *tjibuniensis*, Sody, 1933, Ann. Mag. Nat. Hist. 10, XII, p. 430. W. Java, Tjiboeni.

rajah Group

328. RATTUS MOI, Robinson & Kloss
1922. Ann. Mag. Nat. Hist. 9, IX, p. 95.
Langbian Mountains, S. Annam.

329. RATTUS SURIFER SURIFER, Miller
1900. Proc. Biol. Soc. Washington, XIII, p. 148.
Trang, Lower Siam.

330. RATTUS SURIFER FINIS, Kloss
1916. Proc. Zool. Soc. London, p. 51.
Klong Menao, S.-E. Siam.

331. RATTUS SURIFER CHANGENSIS, Kloss
1916. Proc. Zool. Soc. London, p. 52.
Koh Chang Island, S.-E. Siam.

332. RATTUS SURIFER KUTENSIS, Kloss
1916. Proc. Zool. Soc. London, p. 52.
Koh Kut Island, S.-E. Siam.

333. RATTUS SURIFER PELAGIUS, Kloss

1916. Proc. Zool. Soc. London, p. 53.
Koh Rang Island, S.-E. Siam.

334. RATTUS SURIFER ECLIPSIS, Kloss

1916. Proc. Zool. Soc. London, p. 53.
Koh Kra Island, S.-E. Siam.

335. RATTUS SURIFER TENEBROSUS, Kloss

1916. Proc. Zool. Soc. London, p. 54.
Koh Klum Island, S.-E. Siam.

336. RATTUS SURIFER CONNECTENS, Kloss

1916. Proc. Zool. Soc. London, p. 53.
Koh Mak Island, S.-E. Siam.

337. RATTUS SURIFER LEONIS, Robinson & Kloss

1911. Journ. Fed. Malay States Mus. IV, p. 170.
Singapore.

338. RATTUS SURIFER PEMANGILIS, Robinson

1912. Ann. Mag. Nat. Hist. 8, X, p. 593.
Pulau Pemanggil, Johore Archipelago, Malaya.

339. RATTUS SURIFER MANICALIS, Robinson & Kloss

1914. Ann. Mag. Nat. Hist. 8, XIII, p. 230.
Koh Pennan, N.-E. Malay Peninsula.

340. RATTUS SURIFER SPURCUS, Robinson & Kloss

1914. Ann. Mag. Nat. Hist. 8, XIII, p. 230.
Koh Samui, N.-E. Malaya.

341. RATTUS SURIFER FLAVIDULUS, Miller

1900. Proc. Biol. Soc. Washington, XIII, p. 189.
Pulau Lankawi Island, west coast Malay Peninsula at northern extremity of Straits of Malacca.

342. RATTUS SURIFER BUTANGENSIS, Miller

1900. Proc. Biol. Soc. Washington, XIII, p. 190.
Pulau Adang, Butang Islands, west coast Malay Peninsula.

343. RATTUS SURIFER GRANDIS, Kloss

1911. Ann. Mag. Nat. Hist. 8, VII, p. 119.
Great Redang Island, off Trengganu, E. Malaya.

344. RATTUS SURIFER FLAVIGRANDIS, Kloss

1911. Ann. Mag. Nat. Hist. 8, VII, p. 119.
East Perhentian Island, off Trengganu, Malaya.

345. RATTUS SURIFER AORIS, Robinson

1912. Ann. Mag. Nat. Hist. 8, X, p. 594.
Pulau Aor, Johore Archipelago.

346. RATTUS SURIFER BINOMINATUS, Kloss

1915. Journ. Fed. Malay States Mus. V, p. 223.
Tioman Island, east coast Malay Peninsula.
Synonym: *microdon*, Kloss, 1908, Journ. Fed. Malay States Mus. II, p. 145, preoccupied.

347. RATTUS SURIFER LINGENSIS, Miller

1900. Proc. Washington Acad. Sci. II, p. 206.
Linga Island, Rhio-Lingga Archipelago.

348. RATTUS SURIFER BANACUS, Lyon
1916. Proc. U.S. Nat. Mus. LII, p. 449.
Banjak Islands (Pulau Bankaru), Sumatra.

349. RATTUS SURIFER ANTUCUS, Lyon
1916. Proc. U.S. Nat. Mus. LII, p. 449.
Banjak Islands (Pulau Bankaru), Sumatra.

350. RATTUS SURIFER MABALUS, Lyon
1916. Proc. U.S. Nat. Mus. LII, p. 449.
Tana Masa, Batu Islands, Sumatra.

351. RATTUS SURIFER PINATUS, Lyon
1916. Proc. U.S. Nat. Mus. LII, p. 448.
Pulau Pinie, Batu Islands, Sumatra.

352. RATTUS SURIFER RAVUS, Robinson & Kloss
1916. Journ. Straits Br. Roy. Asiat. Soc. LXXIII, p. 272.
Sungei Kumbang, Korinchi, W. Sumatra.

353. RATTUS SURIFER SOLARIS, Sody
1934. Nat. Tidjs. Ned. Ind. XCIV, p. 170.
Gunung Gedeh, W. Java.

354. RATTUS SURIFER BANDAHARA, Robinson
1921. Ann. Mag. Nat. Hist. 9, VII, p. 235.
Kina Balu, Borneo.

355. RATTUS PELLAX, Miller
1900. Proc. Biol. Soc. Washington, XIII, p. 147.
Trang, Lower Siam.

356. RATTUS COXINGI, Swinhoe
1864. Proc. Zool. Soc. London, p. 185.
Formosa.
Synonym: *coninga*, Swinhoe, same reference.

357. RATTUS RAJAH RAJAH, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 451.
Sarawak, Borneo.

358. RATTUS RAJAH SIARMA, Kloss
1918. Journ. Nat. Hist. Soc. Siam, III, 2, p. 75.
Sikawtur, 40 miles north-west of Raheng, W. Siam.

359. RATTUS RAJAH KORATIS, Kloss
1919. Journ. Nat. Hist. Soc. Siam, III, 4, p. 376.
Lat But Kao, E. Siam.

360. RATTUS RAJAH KRAMIS, Kloss
1919. Journ. Nat. Hist. Soc. Siam, III, 4, p. 377.
Koh Kiam, Gulf of Siam.

361. RATTUS RAJAH SIMILIS, Robinson & Kloss
1916. Journ. Str. Br. Roy. Asiat. Soc. LXXIII, p. 272.
Korinchi Valley, W. Sumatra.

362. RATTUS RAJAH VERBEEKI, Sody
1930. Zool. Med. Leiden, 13, p. 130.
Java.

363. RATTUS RAJAH HIDONGIS, Kloss
1921. Treubia, Buitenzorg, 2, p. 122.
S. Natuna Islands.

364. RATTUS LUTEOLUS, Miller
1903. Smiths. Misc. Coll. XLV, p. 36.
St. Matthew Island, Mergui Archipelago.

365. RATTUS UMBRIDORSUM, Miller
1903. Smiths. Misc. Coll. XLV, p. 37.
Loughborough Island, Mergui Archipelago

366. RATTUS CASENSIS, Miller
1903. Smiths. Misc. Coll. XLV, p. 38.
Chance Island, Mergui Archipelago.

367. RATTUS DOMELICUS, Miller
1903. Smiths. Misc. Coll. XLV, p. 39.
Domel Island, Mergui Archipelago.

368. RATTUS BENTINCANUS, Miller
1903. Smiths. Misc. Coll. XLV, p. 38.
Bentinck Island, Mergui Archipelago.

369. RATTUS CATELLIFER, Miller
1903. Proc. U.S. Nat. Mus. XXVI, p. 464.
Pulau Mansalar, W. Sumatra.

370. RATTUS PAGENSIS, Miller
1903. Smiths. Misc. Coll. XLV, p. 39.
S. Pagi Island, W. Sumatra.

371. RATTUS INFLATUS, Robinson & Kloss
1916. Journ. Straits Br. Roy. Asiat. Soc. LXXIII, p. 273.
Sungei Kumbang, Korinchi, W. Sumatra

372. RATTUS PERFLAVUS, Lyon
1911. Proc. U.S. Nat. Mus. XL, p. 108.
Pulau Laut, S.-E. Borneo.

373. RATTUS CARIMATAE, Miller
1906. Proc. U.S. Nat. Mus. XXXI, p. 59.
Karimata Island, W. Borneo.

374. RATTUS SERUTUS, Miller
1906. Proc. U.S. Nat. Mus. XXXI, p. 59.
Pulau Serutau, Karimata Island, W. Borneo

375. RATTUS SATURATUS, Lyon
1911. Proc. U.S. Nat. Mus. XL, p. 109.
Pulau Panebangen, W. Borneo.

376. RATTUS UBECUS, Lyon
1911. Proc. U.S. Nat. Mus. XL, p. 109.
Pulau Sebuku, S.-E. Borneo.

377. RATTUS ANAMBAE, Miller
1900. Proc. Washington Acad. Sci. II, p. 205.
Pulau Jimaja, Anamba Islands.

378. RATTUS PANGLIMA, Robinson

1921. Ann. Mag. Nat. Hist. 9, VII, p. 235.
Palawan, Philippine Islands.
Synonym: *palawanensis*, Taylor, 1934, Philippine Land Mammals, p. 416. Palawan.

379. RATTUS HELLWALDI HELLWALDI, Jentink

1878. Notes Leyden Mus. p. 11.
Menado, Celebes.

380. RATTUS HELLWALDI LOCALIS, Miller & Hollister

1921. Proc. Biol. Soc. Washington, XXXIV, p. 74.
North of Parigi, Celebes.

381. RATTUS HELLWALDI CEREUS, Miller & Hollister

1921. Proc. Biol. Soc. Washington, XXXIV, p. 74.
Toli Toli, N.-W. Celebes.

edwardsi-sabanus Group

382. RATTUS MELLI, Matschie

1922. Arch. Naturg. 88, Heft 10, p. 26.
N. Canton, S. China.

383. RATTUS EDWARDSI EDWARDSI, Thomas

1882. Proc. Zool. Soc. London, p. 587.
W. Fokien, China.

384. RATTUS EDWARDSI MILLETTI, Robinson & Kloss

1922. Ann. Mag. Nat. Hist. 9, IX, p. 94.
Dalat, Langbian Plateau, S. Annam.

385. RATTUS EDWARDSI LISTERI, Thomas

1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 406.
Darjiling, Himalayas.

386. RATTUS EDWARDSI GARONUM, Thomas

1921. Journ. Bombay Nat. Hist. Soc. XXVIII, p. 27.
Tura, Garo Hills, Assam.

387. RATTUS EDWARDSI CILIATUS, Bonhote

1900. Proc. Zool. Soc. London, p. 879.
Gunung Inas, Perak, Malay Peninsula.

388. RATTUS EDWARDSI SETIGER, Robinson & Kloss

1916. Journ. Str. Br. Roy. Asiat. Soc. LXXIII, p. 271.
West side Barisan Range, Korinchi, W. Sumatra.

389. RATTUS EDWARDSI GIGAS, Satunin

1903. Ann. Mus. Zool. St. Petersb. VII, p. 16.
Near Lun-fan-fu, Szechuan, China. Status *fide* Osgood.

390. RATTUS SABANUS SABANUS, Thomas

1887. Ann. Mag. Nat. Hist. 5, XX, p. 269.
Kina Balu, Borneo.

391. RATTUS SABANUS REVERTENS, Robinson & Kloss
1922. Ann. Mag. Nat. Hist. 9, IX, p. 95.
Daban, Phanrang Province, S. Annam.

392. RATTUS SABANUS ULULANS, Robinson & Kloss
1916. Journ. Str. Br. Roy. Asiat. Soc. LXXIII, p. 272.
Siolak Dras, Korinchi Valley, W. Sumatra.

393. RATTUS SABANUS BUNGURANENSIS, Chasen
1935. Bull. Raffles Mus. 10, p. 17.
Bunguran Island, Natunas.

394. RATTUS SABANUS MAYAPAHIT, Robinson & Kloss
1919. Ann. Mag. Nat. Hist. 9, IV, p. 375.
Tjibodas, W. Java.

395. RATTUS KENNETHI, Kloss
1918. Journ. Nat. Hist. Soc. Siam, III, p. 61.
Sikawtur, 40 miles north-west of Raheng, W. Siam.

396. RATTUS VOCIFERANS VOCIFERANS, Miller
1900. Proc. Biol. Soc. Washington, XIII, p. 138.
Trang, Lower Siam.

397. RATTUS VOCIFERANS HERBERTI, Kloss
1916. Journ. Nat. Hist. Soc. Siam, II, p. 25.
Pak Jong, E. Siam.

398. RATTUS VOCIFERANS INSULARUM, Miller
1913. Smiths. Misc. Coll. LXI, p. 19.
Domel Island, Mergui Archipelago.

399. RATTUS VOCIFERANS CLARAE, Miller
1913. Smiths. Misc. Coll. LXI, p. 20.
Clara Island, Mergui Archipelago.

400. RATTUS VOCIFERANS TAPANULIUS, Lyon
1916. Proc. Biol. Soc. Washington, XXIX, p. 209.
Tapanuli Bay, W. Sumatra.

401. RATTUS VOCIFERANS TERSUS, Thomas & Wroughton
1909. Ann. Mag. Nat. Hist. 8, IV, p. 535.
Terutau Island, Straits of Malacca.

402. RATTUS VOCIFERANS LANCAVENSIS, Miller
1900. Proc. Biol. Soc. Washington, XIII, p. 188.
Pulau Lankawi, west coast Malay Peninsula.

403. RATTUS STOICUS, Miller
1902. Proc. U.S. Nat. Mus. XXIV, p. 759.
Henry Lawrence Island, Andamans.

404. RATTUS TACITURNUS, Miller
1902. Proc. U.S. Nat. Mus. XXIV, p. 762.
S. Andaman Island, Andamans.

405. RATTUS STENTOR, Miller
1913. Smiths. Misc. Coll. LXI, p. 19.
James Island, Mergui Archipelago.

406. RATTUS STRIDULUS, Miller
1903. Smiths. Misc. Coll. XLV, p. 29.
Bentinck Island, Mergui Archipelago.

407. RATTUS MATTHAEUS, Miller
1903. Smiths. Misc. Coll. XLV, p. 29.
St. Matthew Island, Mergui Archipelago.

408. RATTUS LUCAS, Miller
1903. Smiths. Misc. Coll. XLV, p. 30.
St. Luke Island, Mergui Archipelago.

409. RATTUS SIPORANUS, Thomas
1895. Ann. Mus. Civ. Stor. Nat. Genova, XXXIV, p. 11.
Sipora Island, Sumatra.

410. RATTUS SOCCATUS, Miller
1903. Smiths. Misc. Coll. XLV, p. 30.
N. Pagi Island, west coast Sumatra.

411. RATTUS FREMENS FREMENS, Miller
1902. Proc. Acad. Nat. Sci. Philadelphia, p. 154.
Sinkep Island, Rhio-Lingga Archipelago.

412. RATTUS FREMENS MANSALARIS, Lyon
1916. Proc. U.S. Nat. Mus. LII, p. 450.
Pulau Mansalar, W. Sumatra.

413. RATTUS FREMENS TUANCUS, Lyon
1916. Proc. U.S. Nat. Mus. LII, p. 451.
Pulau Tuangku, Banjak Islands, Sumatra.

414. RATTUS BALAE, Miller
1903. Smiths. Misc. Coll. XLV, p. 33.
Tana Bala, Batu Islands, west coast Sumatra

415. RATTUS MASAE, Miller
1903. Smiths. Misc. Coll. XLV, p. 32.
Tana Masa, Batu Islands, W. Sumatra

416. RATTUS NASUTUS, Lyon
1911. Proc. U.S. Nat. Mus. XL, p. 104.
Pulau Panebangen, W. Borneo.

417. RATTUS LUTA, Miller
1913. Smiths. Misc. Coll. LXI, p. 18.
Pulau Laut, Dutch S.-E. Borneo.

418. RATTUS STRIDENS, Miller
1903. Smiths. Misc. Coll. XLV, p. 28.
Tioman Island, Malaya.

419. RATTUS STREPITANS, Miller
1900. Proc. Washington Acad. Sci. II, p. 207.
Pulau Siantan, Anamba Islands.

bowersi Group

420. RATTUS FERREOCANUS, Miller
1900. Proc. Biol. Soc. Washington, XIII, p. 140.
Trang, Lower Siam.

421. RATTUS BOWERSI BOWERSI, Anderson
1879. Zool. Res. Yunnan, p. 304.
Hotha, Yunnan.

422. RATTUS BOWERSI LATOUCHEI, Thomas
1897. Ann. Mag. Nat. Hist. 6, XX, p. 113.
Kuatun, N.-W. Fokien, S. China.

423. RATTUS BOWERSI LACTIVENTER, Kloss
1918. Journ. Nat. Hist. Soc. Siam, III, p. 80.
Sikawtur, 40 miles north-west of Raheng, Siam.

424. RATTUS WELLSI, Thomas
1921. Journ. Bombay Nat. Hist. Soc. XXVIII, p. 26.
Khasi Hills, Assam.

425. RATTUS MACKENZIEI MACKENZIEI, Thomas
1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 410.
Haingyan, 50 miles N. of Kindat, Chin Hills, Burma.

426. RATTUS MACKENZIEI FEAE, Thomas
1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 412.
Tenasserim.

berdmorei Group

427. RATTUS MANIPULUS, Thomas
1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 412.
Kampat, Kabaw Valley, Upper Burma.

428. RATTUS BERDMOREI BERDMOREI, Blyth
1851. Journ. Asiat. Soc. Bengal, XX, p. 173.
Burma.

429. RATTUS BERDMOREI MAGNUS, Kloss
1916. Proc. Zool. Soc. London, p. 57.
Klong Menao, S.-E. Siam.

430. RATTUS BERDMOREI MULLULUS, Thomas
1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 413.
Tenasserim.

leucopus Group

431. RATTUS LEUCOPUS LEUCOPUS, Gray
1867. Proc. Zool. Soc. London, p. 598.
Cape York, Queensland.
Synonym: *terraereginae*, Alston, 1879, Proc. Zool. Soc. London, p. 646.

432. RATTUS LEUCOPUS RINGENS, Peters & Doria
1880. Ann. Mus. Civ. Stor. Nat. Genova, XVI, p. 700.
Fly River, British New Guinea.

433. RATTUS LEUCOPUS RATTICOLOR, Jentink
1908. Nova Guinea, 9, p. 7.
Noord River, Dutch New Guinea.

434. RATTUS LEUCOPUS UTAKWA, Rümmler
1935. Zeitschr. für Säugetierk. 10, p. 115.
Utakwa River, New Guinea.

435. RATTUS LEUCOPUS MORDAX, Thomas
1904. Ann. Mag. Nat. Hist. 7, XIV, p. 398.
N.-E. British New Guinea.

436. RATTUS LEUCOPUS COENORUM, Thomas
1922. Ann. Mag. Nat. Hist. 9, IX, p. 262.
Mamberano River, N. New Guinea.
Synonym: *bandiculus*, Thomas, 1922, Ann. Mag. Nat. Hist. 9, IX, p. 262. Mamberano River, New Guinea.

437. RATTUS LEUCOPUS TRAMITIUS, Thomas
1922. Ann. Mag. Nat. Hist. 9, IX, p. 262.
Mamberano-Idenberg region, N. New Guinea.

438. RATTUS LEUCOPUS STEINI, Rümmler
1935. Zeitschr. für Säugetierk. 10, p. 115.
Kunupi, Weyland Range, New Guinea.

439. RATTUS LEUCOPUS RUBER, Jentink
1879. Notes Leyden Mus. II, p. 18.
New Guinea.

440. RATTUS LEUCOPUS JOBIENSIS, Rümmler
1935. Zeitschr. für Säugetierk. 10, p. 116.
Japen Island, New Guinea.

441. RATTUS LEUCOPUS PRAETOR, Thomas
1888. Ann. Mag. Nat. Hist. 6, I, p. 158.
Ada, Guadulcanar, Solomon Islands.
Synonym: *praetor mediocris*, Troughton, 1936, Rec. Austral. Mus. 19, p. 343. Buin, Bougainville, Solomons. Status *fide* Rümmler.

442. RATTUS LEUCOPUS FELICEUS, Thomas
1920. Ann. Mag. Nat. Hist. 9, VI, p. 423.
Mt. Manusela, Ceram.

verecundus Group

443. RATTUS VERECUNDUS VERECUNDUS, Thomas
1904. Nov. Zool. XI, p. 598.
Avera, Aroa River, British New Guinea.

444. RATTUS VERECUNDUS MOLLIS, Rümmler
1935. Zeitschr. für Säugetierk. 10, p. 116.
Morobe, Mt. Misim, N.-E. New Guinea.

445. RATTUS VERECUNDUS FORSTERI, Rümmler
1935. Zeitschr. für Säugetierk. 10, p. 117.
Bulung, New Guinea.

446. RATTUS VERECUNDUS UNICOLOR, Rümmler
1935. Zeitschr. für Säugetierk. 10, p. 117.
Kunupi, Weyland Range, New Guinea.

niobe Group

447. RATTUS NIOBE NIOBE, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 327.
Owgarra, Angabunga River, New Guinea.

448. RATTUS NIOBE STEVENSI, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 117.
Morobe, Mt. Misim, New Guinea.

449. RATTUS NIOBE RUFULUS, Thomas

1922. Ann. Mag. Nat. Hist. 9, IX, p. 669.
Saruwaged Mountains, N.-E. New Guinea.

450. RATTUS NIOBE ARROGANS, Thomas

1922. Ann. Mag. Nat. Hist. 9, IX, p. 263.
Doormanpad-bivak, N. New Guinea.

451. RATTUS NIOBE HAYMANI

New name for *klossi*, Thomas, 1913, Ann. Mag. Nat. Hist. 8, XII, p. 207.
Upper Utakwa River, Dutch New Guinea. Not *Rattus klossi*, Bonhote, 1906.

452. RATTUS NIOBE CLARAE, Rümmler[1]

1935. Zeitschr. für Säugetierk. 10, p. 118.
Sumuri, Weyland Range, New Guinea.

453. RATTUS NIOBE ARFAKIENSIS, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 118.
Arfak Mountains, New Guinea.

tunneyi-villosissimus Group

454. RATTUS TUNNEYI, Thomas

1904. Nov. Zool. XI, p. 223.
Mary River, N. Territory, Australia.

455. RATTUS BRACHYRHINUS, Tate & Archbold

1935. Amer. Mus. Nov. 802, p. 4.
Boroka, St. Joseph's River, Coast Region, S. Papua.

456. RATTUS MELVILLEUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 427.
Melville Island, N. Australia.

457. RATTUS CULMORUM CULMORUM, Thomas & Dollman

1909. Proc. Zool. Soc. London, 1908, p. 790.
Beach Mountain, Inkerman, Queensland.

458. RATTUS CULMORUM VALLESIUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 426.
Macquarie River, Upper Darling, New South Wales.

459. RATTUS CULMORUM AUSTRINUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 427.
Port Lincoln, S. Australia.

460. RATTUS CULMORUM YOUNGI, Thomas

1926. Ann. Mag. Nat. Hist. 9, XVIII, p. 309.
Moreton Island, Queensland.

[1] Preoccupied by No. 399 of this list. I therefore rename it *pococki*.

461. RATTUS SORDIDUS, Gould
1858. Proc. Zool. Soc. London, 1857, p. 242.
Darling Downs, S. Queensland.

462. RATTUS CONATUS, Thomas
1923. Ann. Mag. Nat. Hist. 9, XII, p. 159.
Annam River, Cooktown, N. Queensland.

463. RATTUS COLLETTI, Thomas
1904. Nov. Zool. XI, p. 599.
S. Alligator River, N. Australia.

464. RATTUS WOODWARDI, Thomas
1908. Ann. Mag. Nat. Hist. 8, II, p. 374.
Lagrange Bay, N.-W. Australia.

465. RATTUS VILLOSISSIMUS VILLOSISSIMUS, Waite
1898. Proc. Roy. Soc. Victoria, X (n.s.), p. 125.
Barcoo River, Central Australia.
Synonym: *longipilis*, Gould, 1854, Mamm. Austral. iii, p. 13, preoccupied.

466. RATTUS VILLOSISSIMUS PROFUSUS, Thomas
1921. Ann. Mag. Nat. Hist. 9, VIII, p. 620.
Liverpool Plains, New South Wales.

fuscipes–lutreolus Group

467. RATTUS ASSIMILIS ASSIMILIS, Gould
1858. Proc. Zool. Soc. London, 1857, p. 241.
Clarence River, New South Wales.

468. RATTUS ASSIMILIS CORACIUS, Thomas
1923. Ann. Mag. Nat. Hist. 9, XI, p. 173.
Ravenshoe, N. Queensland.

469. RATTUS MANICATUS, Gould
1858. Proc. Zool. Soc. London, 1857, p. 242.
Port Essington, N. Australia.

470. RATTUS GREYI GREYI, Gray
1841. Journ. Two Exp. Australia (Grey), ii, app. pp. 404, 410.
S. Australia.

471. RATTUS GREYI MURRAYI, Thomas
1923. Ann. Mag. Nat. Hist. 9, XI, p. 601.
Pearson's Island, S. Australia.

472. RATTUS FUSCIPES FUSCIPES, Waterhouse
1839. Zool. Voy. Beagle, Mamm. p. 66, pl. xxv.
King George's Sound, S.-W. Australia.

473. RATTUS FUSCIPES GLAUERTI, Thomas
1926. Ann. Mag. Nat. Hist. 9, XVIII, p. 308.
Abrolhos Island, W. Australia.

474. RATTUS MONDRAINEUS, Thomas
1921. Ann. Mag. Nat. Hist. 9, VIII, p. 428.
Mondrain Island, S.-W. Australia.

475. RATTUS VELLEROSUS, Gray

1847. Proc. Zool. Soc. London, p. 5.
Plains between Rivers Murray and Glenelg, S. Australia.

476. RATTUS VELUTINUS, Thomas

1882. Ann. Mag. Nat. Hist. 5, IX, p. 415.
Tasmania.
Synonym: *castaneus*, Higgins & Petterd, 1884, Pap. Proc. Roy. Soc. Tasmania, 1883, p. 183.

477. RATTUS LUTREOLUS, Gray

1841. Journ. Two Exped. Australia (Grey), ii, app. pp. 404, 409.
S. Australia.

Subgenus *Stochomys*, Thomas

478. RATTUS LONGICAUDATUS LONGICAUDATUS, Tullberg

1893. N. Act. Upsala, 3, XVI, Muriden aus Kamerun, p. 36.
Cameroons, W. Africa.
Synonym: *sebastianus*, de Winton, 1897, Ann. Mag. Nat. Hist. 6, XIX, p. 463.
hypoleucus, Pucheran, Rev. Mag. Zool. 2, VII, 206, 1855. Not of Sundevall.

479. RATTUS LONGICAUDATUS ITURICUS, Thomas

1915. Ann. Mag. Nat. Hist. 8, XVI, p. 149.
Medje, Upper Ituri.

Subgenus *Praomys*, Thomas

480. RATTUS TULLBERGI TULLBERGI, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIII, p. 205.
Ankober River, Wasa, Ashanti, W. Africa.
Synonym: *burtoni*, Thomas, 1892, Ann. Mag. Nat. Hist. 6, X, p. 182.

481. RATTUS TULLBERGI PEROMYSCUS, Heller

1909. Smiths. Misc. Coll. LII, 4, p. 472.
Sotik, Kenya.

482. RATTUS TULLBERGI JACKSONI, de Winton

1897. Ann. Mag. Nat. Hist. 6, XX, p. 318.
Entebbe, Uganda.

483. RATTUS TULLBERGI MONTIS, Thomas & Wroughton

1910. Trans. Zool. Soc. London, XIX, p. 503.
Ruwenzori, Uganda.

484. RATTUS TULLBERGI MELANOTUS, G. M. Allen & Loveridge

1933. Bull. Mus. Comp. Zool. Harvard Coll. LXXV, 2, p. 106.
Poroto Mountains, north-west of Lake Nyasa, Tanganyika.

485. RATTUS TULLBERGI ROSTRATUS, Miller

1900. Proc. Washington Acad. Sci. II, p. 637.
Mt. Coffee, Liberia.

486. RATTUS TULLBERGI VIATOR, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 461.
N. Nigeria.

487. RATTUS TULLBERGI LUKOLELAE, Hatt
1934. Amer. Mus. Nov. 708, p. 13.
Lukolela, Middle Congo.

488. RATTUS TULLBERGI MINOR, Hatt
1934. Amer. Mus. Nov. 708, p. 11.
Lukolela, Middle Congo.

489. RATTUS TULLBERGI DELECTORUM, Thomas
1910. Ann. Mag. Nat. Hist. 8, VI, p. 430.
Mlanje Plateau, Nyasa.

490. RATTUS TAITAE, Heller
1912. Smiths. Misc. Coll. LIX, 16, p. 9.
Taita Hills, Kenya.

491. RATTUS MORIO, Trouessart
1890. Bull. Soc. Étud. Sci. D'Angers, p. 121.
Cameroon Mountain.
Synonym: *maurus*, Gray, 1862, Proc. Zool. Soc. London, p. 181. Preoccupied.

492. RATTUS BUTLERI, Wroughton
1907. Ann. Mag. Nat. Hist. 7, XX, p. 503.
Bahr-el-Ghazal, Sudan.

Subgenus *Hylomyscus*, Thomas

493. RATTUS AETA AETA, Thomas
1911. Ann. Mag. Nat. Hist. 8, VII, p. 591.
Bitye, Ja River, Cameroons.

494. RATTUS AETA LATICEPS, Osgood
1936. Field. Mus. Nat. Hist. Pub. Zool. ser. XX, p. 247.
South-west slope of Mt. Cameroons, Cameroon Mandate, British Nigeria.

495. RATTUS AETA WEILERI, Lönnberg & Gyldenstolpe
1925. Arkiv. Zool. Band 17B, no. 5, p. 3.
Mt. Mikeno, near Lake Kivu, Congo.

496. RATTUS AETA SCHOUTEDENI, Dollman
1914. Extr. Rev. Zool. Afr. IV, fasc. 1, p. 82.
Mambaka, Congo.

497. RATTUS STELLA STELLA, Thomas
1911. Ann. Mag. Nat. Hist. 8, VII, p. 590.
Between Mawambi and Avakubi, Ituri, E. Congo.

498. RATTUS STELLA KAIMOSAE, Heller
1912. Smiths. Misc. Coll. LIX, 16, p. 7.
Kaimosi, Kakumega Forest, Kenya.

499. RATTUS DENNIAE DENNIAE, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 144.
Uganda, E. Ruwenzori.
Synonym: *endorobae*, Heller, 1910, Smiths. Misc. Coll. LVI, 9, p. 3.
25 miles north of Eldoma Ravine, Kenya.

500. RATTUS DENNIAE VULCANORUM, Lönnberg & Gyldenstolpe
1925. Arkiv. Zool. Band. 17B, no. 5, p. 4.
Mt. Karissimbi, Birunga Volcanoes, Congo.

501. RATTUS CARILLUS, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIII, p. 418.
Pungo Andongo, N. Angola.

502. RATTUS ALLENI ALLENI, Waterhouse

1837. Proc. Zool. Soc. London, p. 77.
Fernando Po.

503. RATTUS ALLENI SIMUS, Allen & Coolidge

1930. Contr. Dep. Trop. Med. Cambridge, Mass. 5, II, p. 599.
Liberia.

Subgenus *Dephomys*, Thomas

504. RATTUS DEFUA, Miller

1900. Proc. Washington Acad. Sci. II, p. 635.
Mt. Coffee, Liberia.

Subgenus *Myomys*, Thomas

505. RATTUS ALBIPES ALBIPES, Rüppell

1845. Mus. Senckenberg, III, p. 107.
Abyssinia.
Synonym: (?) *rufidorsalis alettensis*, Frick, 1914, Ann. Carnegie Mus. 9, p. 17. Aletta, Sidamo, S. Abyssinia.
(?) *rufidorsalis ankoberensis*, Frick, same reference, p. 18.

506. RATTUS ALBIPES FUSCIROSTRIS, Wagner

1845. Arch. Naturg. p. 149.
Senaar, Anglo-Egyptian Sudan.

507. RATTUS BROCKMANI, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 298.
Upper Sheikh, British Somaliland.

508. RATTUS FUMATUS FUMATUS, Peters

1878. Monatsb. K. Preuss. Akad. Wiss. Berlin, p. 200.
Ukamba, Kenya.
Synonym: *niveiventris*, Osgood, 1910, Field. Mus. Nat. Hist. Zool. ser. X, 2, p. 12. Voi, Kenya.
ulae, Heller, 1910, Smiths. Misc. Coll. LVI, 9, p. 3. Ulukenia Hills, Kenya.

509. RATTUS FUMATUS SUBFUSCUS, Osgood

1910. Field. Mus. Nat. Hist. Zool. ser. X, 2, p. 12.
Lake Elmenteita, Kenya.

510. RATTUS FUMATUS TANA, True

1893. Proc. U.S. Nat. Mus. XVI, p. 602.
Tana River, between coast and Hameye, Kenya.

511. RATTUS VERREAUXII, Smith

1834. S. Afr. Quart. Journ. II, p. 156.
Near Cape Town.

512. RATTUS AVUNCULUS, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIII, p. 417.
Pungo Andongo, Angola.

513. RATTUS ANGOLENSIS, Bocage

1890. Jorn. Sci. Lisbon, 2, V, p. 12.
Mossamedes, Angola.

514. RATTUS SHORTRIDGEI, St. Leger

1933. Proc. Zool. Soc. London, p. 411.
Okavango-Omatako junction, Grootfontein district, S.-W. Africa.

515. RATTUS DALTONI DALTONI, Thomas

1892. Ann. Mag. Nat. Hist. 6, X, p. 181.
Probably Fernando Po, W. Africa.

516. RATTUS DALTONI INGOLDBYI

New name for *saturatus*, Ingoldby, Ann. Mag. Nat. Hist. 10, III, p. 511, 1929.
Kintampo, Ashanti, W. Africa.
Not *Rattus saturatus*, Lyon, 1911.

517. RATTUS COLONUS, Brants

1827. Geslacht der Muizen, p. 124.
Algoa Bay, S. Africa.

Subgenus *Mastomys*, Thomas
(typical section)

518. RATTUS COUCHA COUCHA, Smith

1836. App. Rep. Exp. Expl. S. Afr., p. 43.
Between Orange River and the Tropic, Bechuanaland.
Synonym: *fuscus*, Bocage, 1890, Jorn. Sci. Lisbon, 2, V, p. 14. Angola.

519. RATTUS COUCHA MICRODON, Peters

1852. Reise nach Mossambique, Säugeth, p. 149.
Tette, Mozambique.

520. RATTUS COUCHA SILACEUS, Wagner

1842. Arch. Naturg. 1, p. 11.
Albany district, Cape of Good Hope.

521. RATTUS COUCHA PEREGRINUS, de Winton

1897. Proc. Zool. Soc. London, p. 959.
Ras-el-Ain, Haha, Morocco.
Synonym: *calopus*, Cabrera, Bol. Real. Soc. Esp. Hist. Nat. p. 365, 1906. Mogador, Morocco.

522. RATTUS COUCHA GARDULENSIS, Frick

1914. Ann. Carnegie Mus. 9, p. 18.
Gardula, S. Abyssinia.

523. RATTUS COUCHA LATERALIS, Heuglin

1877. Reise N. Ost. Afr. p. 71.
Dembea, Abyssinia.
Synonym: *tacaziena*, Heuglin, same reference, p. 72. Takkaze River, Abyssinia.

524. RATTUS COUCHA NEUMANNI, Heller

1912. Smiths. Misc. Coll. LIX, 16, p. 8.
North Guaso Nyiro, Kenya.

525. RATTUS COUCHA DURUMAE, Heller

1912. Smiths. Misc. Coll. LIX, 16, p. 9.
Mazeras, Kenya.

526. RATTUS COUCHA TINCTUS, Hollister

1918. Smiths. Misc. Coll. LXVIII, 10, p. 1.
Kaimosi, Kavirondo, Kenya.

527. RATTUS COUCHA PANYA, Heller

1910. Smiths. Misc. Coll. LVI, p. 2.
Athi Plains, Kenya.

528. RATTUS COUCHA HILDEBRANDTI, Peters

1878. Monatsb. K. Preuss. Akad. Wiss. Berlin, p. 200.
Ndi, Taita, Kenya.

529. RATTUS COUCHA EFFECTUS, Dollman

1911. Ann. Mag. Nat. Hist. 8, VII, p. 524.
Baringo, Kenya.
Synonym: *evelyni*, Dollman, 1911, Ann. Mag. Nat. Hist. 8, VII, p. 526. Baringo, Kenya.

530. RATTUS COUCHA CUNINGHAMEI, Wroughton

1908. Ann. Mag. Nat. Hist. 8, I, p. 256.
Chivi Islands, Lake Victoria Nyanza.

531. RATTUS COUCHA ISMAILIAE, Heller

1914. Smiths. Misc. Coll. LXIII, 7, p. 9.
Gondokoro, N. Uganda.

532. RATTUS COUCHA PALLIDA, Dollman

1914. Abstr. Proc. Zool. Soc. London, April 7th, p. 25; Proc. Zool. Soc. London, p. 314.
Lobor, Central Province, Uganda.

533. RATTUS COUCHA UGANDAE, de Winton

1897. Ann. Mag. Nat. Hist. 6, XX, p. 317.
Entebbe, Uganda.
Synonym: *somereni*, Kershaw, 1923, Ann. Mag. Nat. Hist. 9, XI, p. 594. Bugishu, Uganda.

534. RATTUS COUCHA VICTORIAE, Matschie

1911. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 342.
Mwanza, Victoria Nyanza, Tanganyika.

535. RATTUS COUCHA ITIGIENSIS, Hatt

1935. Amer. Mus. Nov. 791, p. 3.
Itigi, Tanganyika.

536. RATTUS COUCHA BRADFIELDI, Roberts

1926. Ann. Transv. Mus. XI, p. 257.
Okahandja, S.-W. Africa.
Synonym: *ovamboensis*, Roberts, 1926, Ann. Transv. Mus. XI, 4, p. 258.

537. RATTUS COUCHA NATALENSIS, Smith

1849. Ill. Zool. S. Afr. pl. 47, fig. 2.
Natal.
Synonym: *zuluensis*, Thomas & Schwann, 1905, Proc. Zool. Soc. London, p. 268. Umvolosi, Zululand.
illovoensis, Jentink, 1909, Beitr. Kentn. Faun. S. Afr. p. 248. Lower Illovo, Natal.

538. RATTUS COUCHA LIMPOPOENSIS, Roberts

1914. Ann. Transv. Mus. IV, p. 183.
Sand River, N.-E. Transvaal.

539. RATTUS COUCHA KOMATIENSIS, Roberts

1926. Ann. Transv. Mus. XI, p. 259.
Komati River, Transvaal.

540. RATTUS COUCHA MARIKQUENSIS, Smith

1836. Ann. Rep. Ex. Expl. S. Afr. p. 43.
Rustenberg, Transvaal.
Synonym: *socialis*, Roberts, 1913, Ann. Transv. Mus. IV, p. 88. Transvaal.
breyeri, Roberts, 1915, Ann. Trans. Mus. V, p. 120. Moordrift, Transvaal.

541. RATTUS COUCHA MACROLEPSIS, Sundevall

1842. Kungl. Svensk. Vet. Ak. Handl. Stockholm, p. 218.
Senaar, Sudan.
Synonym: *limbatus*, Wagner, 1845, Arch. Nat. XI, p. 149. Senaar.
azrek, Wroughton, 1911, Ann. Mag. Nat. Hist. 8, VIII, p. 460. Roseires, Blue Nile.
kerensis, Heuglin, 1877, Reise N. Ost. Afr. II, p. 68. Keren, Bogos, Eritrea.

542. RATTUS COUCHA BLAINEI, Wroughton

1907. Ann. Mag. Nat. Hist. 7, XX, p. 502.
Bahr-el-Ghazal, Sudan.

543. RATTUS COUCHA GAMBIANUS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 122.
Gamon, Senegal.

544. RATTUS COUCHA ERYTHROLEUCUS, Temminck

1853. Esq. Zool. Côte de Guiné, p. 160.
Gold Coast, W. Africa.

545. RATTUS COUCHA HUBERTI, Wroughton

1908. Ann. Mag. Nat. Hist. 8, I, p. 255.
Zungeru, N. Nigeria.

546. RATTUS RUFIDORSALIS, Heuglin

1877. Reise N. Ost. Afr. II, p. 70.
Simien, Abyssinia.

(*pernanus* Section)

547. RATTUS PERNANUS, Kershaw

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 568.
Amala River, Kenya.

Subgenus *Micaëlamys*, Ellerman

548. RATTUS GRANTI, Wroughton

1908. Ann. Mag. Nat. Hist. 8, I, p. 257.
Deelfontein, Cape Colony.

Subgenus *Ochromys*, Thomas

549. RATTUS WOOSNAMI, Schwann

1906. Proc. Zool. Soc. London, p. 108.
Molopo, Bechuanaland, S. Africa.

The following species are not allocated to groups:

550. RATTUS GERMAINI, Milne-Edwards

1874. Rech. Mamm. p. 289.
Cochin-China.

551. RATTUS FABERI, Jentink

1883. Notes Leyden Mus. V, p. 176.
N. Celebes.

552. RATTUS BOCOURTI, Milne-Edwards

1876. Rech. Mamm. p. 291, footnote.
Siam.

553. RATTUS CANNA, Swinhoe

1870. Proc. Zool. Soc. London, p. 636.
Formosa.

554. RATTUS ENGANUS, Miller

1906. Proc. U.S. Nat. Mus. XXX, p. 821.
Engano Island, south of Sumatra.

The following are doubtful:

RATTUS AURATUS, Grandidier

1899. Bull. Mus. Paris, V, p. 277.
Morondawa, W. Madagascar.
Probably an introduced rat of the *rattus* group

RATTUS (?) GALANUS, Heuglin

1877. Reise N. Ost. Afr. II, p. 75.
Wologala, N.-E. Africa.
Perhaps based on a *Gerbillus*.

RATTUS (?) (or AETHOMYS) MUSCARDINUS, Wagner

1843. Schreber Säug. Suppl. III, p. 430.
S. Africa.

Australian

The following are not identified by Iredale & Troughton:

PETTERDI, Trouessart

1904. Cat. Mamm. Supl. fasc. ii, p. 373. Tasmania.
Synonym: *tetragonurus*, Higgins & Petterd, 1884, Pap. Proc. Roy. Soc. Tasmania, 1883, p. 195.

BURTONI, Ramsay

1887. Proc. Linn. Soc. N.S.W. 2, II, p. 553. Derby, N.-W. Australia.

PACHYURUS, Higgins & Petterd

1884. Pap. Proc. Roy. Soc. Tasmania, 1883, p. 182. Long Plains, Tasmania.

NOTE

Since the above was completed, I have had opportunity of working through a large collection of *Rattus* Rats from Celebes, collected during the winter of 1938 by Mr. W. J. C. Frost. This collection indicates that some of the conclusions previously reached are erroneous.

To the list of forms seen, above, add: *raveni*, *tatei* (new, described below), *hoffmani*, *frosti* (new, described below), *tetricus*, *dollmani* (new, described below), *sericatus*.

concolor group. *R. raveni*, Miller & Hollister, appears to be a subspecies of *R. concolor*. The form *eurous*, described by these authors is probably synonymous, as specimens from Middle Celebes in the present collection do not seem to be distinguishable from North Celebes specimens.

Rattus tatei, sp. nov.

A large member of the *concolor* group; size about as in very large specimens of *concolor*, from which it differs in the abnormally broad molars, and relatively very long toothrow; teeth also broader than is usual in Celebes representatives of *R. rattus*, and about as broad as in *R. hoffmani*, from which the species differs in much smaller size.

Type, no. 104, adult female, from Tamalanti, Middle Celebes. Skull with all the main characters of the *rattus* or *concolor* group; supraorbital ridges relatively weaker than usual in the two specimens examined; braincase very broad; zygomatic plate moderately projected forwards, not very strong. Palate long, extending slightly behind last molars. Bullae large, about 18 per cent of occipitonasal length. Palatal foramina long, extending between front molars. Molars excessively heavy, length of toothrow about 20·12 per cent of condylobasal length; greatest breadth of molars over 2 mm. M.3 relatively large, but pattern of molars not abnormal. Head and body length, 130 mm. Fur soft; above dark brown, below grey. Tail slightly longer than head and body in the type specimen, slightly shorter in the other specimen, no. 215. The tail has 11–13 rings to the centimetre on the upper part, and is uniformly dark throughout. Hindfoot rather long, but broad, and with long fifth digit, as usual in *rattus* or *concolor* group.

Measurements of type: head and body, 130 mm.; tail, 140; hindfoot, 32·5; ear, 17; condylobasal length, 33·9; upper toothrow, 7 mm.; occipitonasal length, 36·4; bullae, 6·5; braincase breadth, 14·6; length of nasals, 14; diastema, 7·8; palatal foramina, 6·5; least interorbital width, 7·8; greatest breadth, M.1, 2·3 mm.

The species seems clearly differentiated from all members seen of the Celebes *rattus* group (of which it could be a dwarf member) by its much smaller size, and from the *concolor* group by its unusually wide, heavy teeth, and longer toothrow. I name the species after Mr. G. H. H. Tate, whose work on Indo-Malayan Rats has proved so helpful.

rattus group. *R. hoffmani* seems very poorly differentiated from *rattus* Rats except by its broader molars, though regarded as the type of a separate group by Tate. Its mammary formula, 1—3=8, turns up intermittently elsewhere, as in *R. bagopus*, from the Philippines, *R. rogersi* from the Andamans, etc. It suggests a direct derivative from the 2—3=10 formula often present in *rattus* Rats. In all other main characters, as skull, and colour of tail, it seems essentially like *rattus*-group Rats.

However, the tail is most often shorter than the head and body in *hoffmani*, which is not usual in *rattus* Rats, though sometimes occurring.

xanthurus group. These Rats may in almost every case be at once distinguished from *rattus* or *chrysocomus* Rats by the colour of the tail, which is wholly dark basally, wholly light terminally, for a greater or lesser distance. This is constant in all *xanthurus* Rats seen, but from descriptions is not present in *R. punicans* which has been referred to the group, and perhaps in *R. hamatus*. Miller and Tate refer the form *callitrichus* to the genus *Lenomys*. I have not seen the type of *callitrichus*; but forms bearing this name in the B.M., and including some specimens collected by Mr. Frost, are certainly not *Lenomys*, but definitely *Rattus*, in dental characters. Jentink's description is hopelessly inadequate. This Rat has no posterointernal cusp in M.1 and M.2, as *Rattus*; the fur is thicker and softer than in *celebensis*; the bullae appear to be smaller than is usual in *xanthurus* group Rats (not including *dominator*); the toothrow is about 19 per cent of the condylobasal length. The tail is longer than the head and body (slightly), though not so in Jentink's description; but this seems a rather variable character. The palate reaches slightly behind the last molars; the molars are broad and heavy. Tail coloured as usual in *xanthurus* Rats. The ear is rather large. Until the type of *callitrichus* can be examined, the name must remain doubtful. Of the forms belonging to the group examined, *xanthurus*, *marmosurus*, which is, I think, a subspecies of *xanthurus*, and *bontanus* have the palatal foramina long, extending to the anterior portion of toothrow, or beyond it. *R. xanthurus* (with *marmosurus*) differs from all other *xanthurus* Rats seen in the quality of the fur, which has several long hairs interspersed; the molars are shorter than in *bontanus*. The remainder, *callitrichus*, *frosti*, and *celebensis*, have the palatal foramina shorter, not extending back to the front of molars. Of these *callitrichus* has unusually thick fur, and rather smaller bullae. *R. celebensis* has short fur and larger bullae; from *frosti* it differs in having longer palatal foramina and shorter toothrow.

Rattus frosti, sp. nov.

Type, original number 30, from Tamalanti, Middle Celebes; young adult female. A member of the *xanthurus* group probably most nearly allied to *celebensis*. Palatal foramina abnormally shortened, only 51 per cent of diastema. Upper toothrow long, about 19·4 per cent of condylobasal length. Bullae about 13·5 per cent of occipitonasal length. Skull with moderately weak supraorbital ridges; braincase rather broad; upper profile of skull differing from a specimen of *celebensis* from Tonsea, North Celebes, in the weaker supraorbital ridges, wider interorbital region, wider braincase, and shorter interparietal. Zygomatic plate scarcely projected forwards anteriorly. Upper incisors more opisthodont than in *celebensis*, reminiscent of those of *dominator*. Palatal foramina extremely shortened, but not peculiar in form. Palate of moderate width, extending posteriorly about to level of hinder part of third molars. Bullae moderately large and evenly inflated. Molars heavy; M.3 not much reduced. Clear traces present of the fourth inner cusp on the second lamina of M.1 and M.2, as characteristic of *R. hellwaldi*.

Fur thicker than is usual in *celebensis*, but not excessively so. Hindfoot apparently with six plantar pads, the foot broad and heavy, as is usual in the group, very different from the narrow specialized formation of *chrysocomus*, *musschenbroeki*, or *hellwaldi* groups. Tail rings about 11 to the centimetre on the upper part; the tail wholly black for just over a third of its length basally, white for the rest of its length except the terminal 55 mm. on which the white marking is less apparent. Under surface of body and limbs white. Above grey.

Measurements of type, head and body, 185 mm.; tail, 220; hindfoot, 45; ear, 30; condylobasal length, 43·7; upper toothrow (crowns), 8·6; occipitonasal length, 47·3; bullae, 7·6; least interorbital width, 7·4; diastema, 11·4; palatal foramina, 5·8; breadth braincase, 19; length of nasals, 15·7; width of M.1, 2·9; length from front of incisors to back of palate, 25·2. This species is differentiated from *celebensis* by its relatively longer toothrow and shorter palatal foramina; the only other species of the group, from descriptions, with such unusually short palatal foramina seems to be *microbullatus*, which according to descriptions seems to present many features reminiscent of *dominator*, and may belong with that species.

R. frosti differs from *R. arcuatus*, Tate & Archbold, in its longer palatal foramina, and the skull is not specially arched, as described for that species; also the bullae appear a little larger. In addition to the type, No. 142 from Tamalanti belongs to the new species; two specimens from Rantekaroa, numbers 64 and 170, which are too young for certain identification, also appear to belong here. I take pleasure in naming the species after the collector.

dominator group. Though currently referred to the *xanthurus* group, the conclusion has been reached that *R. dominator* represents a thoroughly distinct species. It may represent Tate's *mülleri* group; or it may be a group type. Characters distinguishing *dominator* from *xanthurus* Rats are the unusually small bullae, about 12–14 per cent of occipitonasal length; the unusually short palatal foramina (only approached by *frosti* in B.M. Celebes material) and the unusually heavily thrown forward zygomatic plate, which is present in an exaggerated degree in all but a very few specimens.

chrysocomus group. All described members of this group appear to represent one species only, or very probably so. The foot structure will usually separate a *chrysocomus* Rat from those groups just dealt with, while the more *rattus*-like cranial characters such as normally inflated bullae, normally formed palatal foramina, five-rooted M.1, rather large M.3, and relatively long palate separate them from *musschenbrocki* and *hellwaldi*, the only Celebes representatives I have seen of Tate's progressive division of *Rattus*, which is very sharply distinguished in Celebes from the more *rattus*-like primitive division. A form from Tamalanti, Mid Celebes, may represent a new race, evidently nearest *heinrichi*, but with larger bullae and smaller molars. However, in the absence of knowledge of characters of many of the races not represented in London, I prefer not to name it yet.

musschenbroeki group. From the few specimens of this species I had seen previously I thought this species might be a very distinct representative of the *confucianus* group. A large series in the Frost collection proves this suggestion to be incorrect. *R. musschenbroeki* may be a representative of the *rajah* group, but it is rather small for a member of that group; the tail is usually shorter than the head and body, which separates it from *confucianus* group, as does the hindfoot structure which seems to be just as in *rajah* Rats. M.1 is four-rooted in some specimens of the present series, differing from all Celebes Rats I have examined on the point, including representatives of all the seven groups represented in the Frost collection, except *R. hellwaldi*. The form *tetricus* appears to be a very well-marked race.

hellwaldi group. This species, treated above, following Tate, as a member of the *rajah* group, differs from other Rats of Celebes in the abnormal number of rings of the tail to the centimetre, roughly 15–17 in the upper portion; more than 20 to the centimetre on the terminal portion; therefore making a decided approach to the condition found in *Rattus bartelsi* from Java (a smaller animal), and supporting my assumption that *bartelsi* cannot, until the whole genus is revised, be regarded as forming a genus on this character. (Another species I suspect shares the character of the unusually large number of rings to the tail is *macleari* from Christmas Island.) *R. hellwaldi* has a four-rooted M.1. The extra cusp, situated on the second lamina of M.1 and M.2, on the inner side, proves an absolutely constant character in 36 specimens. From all other species (examined) from Celebes except *musschenbroeki*, which has a normal number of rings to the tail, simple teeth, and is of smaller size, *hellwaldi* may be at once distinguished by the following characters: small, flattened bullae, with tube-shaped anterointernal portion; roots of M.1 less than 5; palate shortened, not extending to hinder part of toothrows; M.3 more reduced; and hindfoot specialized as described above for the *rajah* group. Whether the characters of the tail should separate this species from the *rajah* group I am not able to check at the moment.

Rattus hellwaldi dollmani, subsp. nov.

A specimen collected at Rantekaroa, Quarles Mountains, Middle Celebes, has the tail 120 per cent of head and body length instead of the percentage of (normally) under 100 per cent, rarely up to 102 per cent in our series, up to 107 per cent in Tate's measurements (excepting a specimen of Tate's from South-east Celebes with the rather remarkable measurements of head and body 138 (too small for *hellwaldi*), tail 210; to this measurement Tate adds a footnote: "Note that discrepancies exist in body measurements as taken by the collector"). The ventral surface is coloured differently from all other specimens seen, being more slate-grey. The supraorbital ridges are proportionately weak. The specimen has the two inner roots of M.1 coalesced, so that apparently only three roots are present; the condylobasal length is shorter and the occipitonasal length proportionately shorter than any adult typical *hellwaldi* in the collection from North Celebes; the toothrow is relatively long. (Condylobasal length, 36·6; not under 38 in other adults measured.) Type no. 65; teeth considerably worn; locality, Rantekaroa, Quarles Mountains, Middle Celebes. Measurements of type: head and body, 175 mm.; tail, 210; hindfoot, 38; ear, 25; condylobasal length, 36·6; occipitonasal length, 41·2; upper toothrow, 6·2; bullae length, 7·7; least interorbital width, 7; diastema, 10; palatal foramina, 5·7; length from front of incisors to back of palate, 18·5; breadth of braincase, 16·2; zygomatic width, *circa* 19. The type is female.

This race is named after Captain Guy Dollman of the British Museum.

Miller's race *cereus* does not appear to be well marked and may be a synonym of the typical race, as most of his measurements for this race are covered by individual specimens in the present collection from Tonsea, North Celebes.

List of Rats collected by Mr. Frost in Celebes in 1938

(Forms marked * are new to B.M.)

**Rattus concolor raveni*	21
**Rattus tatei*	2
**Rattus hoffmani*	19
Rattus dammermani	3
Rattus xanthurus marmosurus	10
**Rattus frosti*	4 (2 juvenile)
Rattus celebensis	5
Rattus callitrichus	2
Rattus dominator	17
Rattus chrysocomus fratrorum	41
**Rattus chrysocomus sericatus*	6
Rattus musschenbroeki	34
**Rattus musschenbroeki tetricus*	7
Rattus hellwaldi	34
**Rattus hellwaldi dollmani*	1
**Eropeplus canus*	2
**Echiothrix leucura brevicula*	1

Specimens provisionally identified as *sericatus* are from Rantekaroa, Quarles Mountains.

In addition to these, a good collection of *Hyosciurus heinrichi* was obtained, as noted elsewhere; some specimens of *Sciurillus murinus*, also noted elsewhere; and a few specimens of *Callosciurus rubriventer*; as well as several Porcupines (*Hystrix* and *Thecurus*) from Flores, Java, Sumatra, etc., including a specimen of *Thecurus sumatrae* from Sumatra which has unusually thick heavy quills and probably represents a new race.

Note on earliest names for two of the Groups: The oldest name for the *concolor* group is apparently *Rattus exulans*, Peale, from Fiji. Rümmler, 1938, treats *concolor* as a race of *exulans*. These Rats are apparently House-Rats to a certain extent, which would explain their unusually large range. Doubtless most of the named forms will be races of *exulans*.

The oldest name for the *confucianus* group appears to be *Rattus niviventer*, Hodgson, from the Himalayas. This Rat is stated by Bonhote to be very near *confucianus*, and Schwarz has treated *confucianus* as a race of *niviventer*. *R. rubricosa*, Anderson, is according to Bonhote a member of the *rattus* group, and not of the *niviventer-confucianus* group as it is listed here. According to Osgood, the species *huang* is a race of *fulvescens*, and *ling* is very likely based on young specimens of *huang*. *R. indosinicus*, here listed in this group, appears more allied to the *cremoriventer* group.

R. vociferans, Miller, and its numerous races (*edwardsi* group) may be treated as races of *sabanus* (Robinson & Kloss, 1919).

Genus 39. GYOMYS, Thomas

1910. Gyomys, Thomas, Ann. Mag. Nat. Hist. 8, VI, p. 607.

Type Species.—*Mus novaehollandiae*, Waterhouse.

Range.—Australian: Queensland, New South Wales, Victoria, Central Australia, South Australia.

Number of Forms.—Nine.

Remarks.—This was originally proposed as a subgenus of *Pseudomys* by Thomas; I do not think it is sufficiently specialized to be included in that genus. Actually it is barely distinguishable from *Rattus*, though very distinct indeed from Australian *Rattus*. It is retained mostly for convenience.

Characters.—Skull with broad braincase, considerable interorbital constriction, no supraorbital ridges. Bullae rather small. Incisive foramina medium. Pterygoid region as in *Leggadina*. (But there are species of *Rattus* which come near this formation.) Teeth normal, rather of simplified *Rattus* type; M.3 medium; no extra lamina (or traces of it) in front of foremost lamina of M.1. T.3, the anteroexternal cusp of M.1, is almost suppressed.

Fur very soft; tail subequal in length to head and body; size small, 68–115 mm. (70–105 in B.M. specimens); digits normal. Coronoid process of mandible strongly reduced in all seen. Pectoral mammae suppressed (?).

Forms seen: *albocinereus*, *glaucus*, *novaehollandiae*, *squalorum*.

List of Named Forms

1. GYOMYS GLAUCUS, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 609.
S. Queensland.

2. GYOMYS BERNEYI, Troughton

1936. Mem. Queensland Mus. Brisbane, 11, p. 15.
Barcarolle Station, 135 miles south of Longreach, Queensland.

3. GYOMYS PUMILUS, Troughton

1936. Mem. Queensland Mus. Brisbane, 11, p. 16.
Byfield, 25 miles north of Yeppoon, near Rockhampton, Coastal Queensland.

4. GYOMYS FUMEUS, Brazenor

1934. Mem. Nat. Mus. Victoria, VIII, p. 158.
Turton's Pass, Otway Forest, Victoria.

5. GYOMYS NOVAEHOLLANDIAE, Waterhouse

1843. Proc. Zool. Soc. London, 1842, p. 146.
Upper Hunter River, New South Wales.

6. GYOMYS APODEMOIDES, Finlayson

1932. Trans. Proc. Roy. Soc. S. Australia, LVI, p. 170.
Combe, N.-E. district of S. Australia.

7. GYOMYS DESERTOR, Troughton

1932. Rec. Austr. Mus. XVIII, p. 293.
Wycliffe Creek, Central Australia.

8. GYOMYS ALBOCINEREUS ALBOCINEREUS, Gould

1845. Proc. Zool. Soc. London, p. 78.
Moore's River, W. Australia.

9. GYOMYS ALBOCINEREUS SQUALORUM, Thomas

1907. Proc. Zool. Soc. London (1906), p. 776.
Bernier Island, Shark's Bay, W. Australia.

Genus 40. LEPORILLUS, Thomas

1906. Leporillus, Thomas, Ann. Mag. Nat. Hist. 7, XVII, p. 83.

Type Species.—*Conilurus apicalis*, Gould.

Range.—Australian: South Australia, New South Wales, Franklyn Island.

Number of Forms.—Three.

Characters.—Much like *Conilurus*, but with no well-marked posterointernal cusp in the first and second upper molars. Supraorbital ridges evidently absent. Incisive foramina large, well open, reaching tooth-rows. Bullae large. Zygoma sloping upwards rather sharply anteriorly, to a high level. Molars heavy, M.3 little reduced. So few skulls are present in London that it is not possible to give a detailed account of the dentition; in old age the cusps are obliterated and the original spaces between the lamina are isolated as enamel islands, and a young specimen presents a dentition rather like that of a very angular *R. lutreolus*; with heavy cusps (but evidently developing in a *Rattus*-like manner, i.e. tending to fuse into each other, at least in the outer and centre rows). M.3 relatively large.

Fur thick, soft. Ear large. Tail shorter than head and body, so far as seen; very well haired. Hindfeet not much lengthened, length and proportion of digits about as in normal *Rattus*. Size rather large (up to 200 mm. head and body, or perhaps more).

I have not seen *L. conditor*, which appears to have much larger bullae than in the type, as figured by Wood Jones. From his measurements, the interorbital region of the skull appears to be somewhat extremely constricted, in the genus, averaging under 13 per cent of "greatest length," which appears to be about as in *Stenocephalemys* and other genera with extremely constricted frontals, but two of our skulls exceed this measurement. The zygomatic plate is not concave anteriorly (compare *Pseudomys*). Coronoid process very low.

These Rats are stated to build elaborate "houses."

Forms seen: *apicalis, jonesi.*

List of Named Forms

1. LEPORILLUS APICALIS, Gould

1851. Proc. Zool. Soc. London, p. 126.
S. Australia.

2. LEPORILLUS JONESI, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 618.
Franklyn Island, Nuyt's Archipelago, S. Australia.

3. LEPORILLUS CONDITOR, Sturt

1848. Narr. Exped. Centr. Australia, 1, p. 120, col. pl. ex Gould MS.
Darling River, New South Wales.

Genus 41. PSEUDOMYS, Gray

1832. Pseudomys, Gray, Proc. Zool. Soc. London, XVI, p. 39.
1910. Thetomys, Thomas, Ann. Mag. Nat. Hist. 8, VI, p. 606. (*Mus nanus*, Gould.) Valid as a subgenus.

Type Species.—*Pseudomys australis*, Gray.

Range.—Australian: Queensland, New South Wales, South Australia, Western Australia, Tasmania.

Number of Forms.—Thirteen.

Remarks.—In 1910, Thomas divided the more *Rattus*-like Rats of Australia, or those which were not included in *Conilurus, Notomys, Leporillus* and *Mesembriomys*, into two genera, *Rattus* ("*Epimys*") and *Pseudomys*, for which he gave the following characters. Pectoral mammae believed to be always absent in *Pseudomys* (0—2 = 4), present in *Rattus*. Pterygoids variable in *Pseudomys*, normal in *Rattus*. Skull without supraorbital ridges in *Pseudomys*, these present in *Rattus*. *Pseudomys* contained four subgenera, *Pseudomys, Thetomys, Gyomys*, and *Leggadina*. But as subsequently noted by Thomas, supraorbital ridges are not always present in *Rattus*, and it is the Australian branch of the genus in which these ridges are more often not developed. Also, even if pectoral mammae are always suppressed in Australian *Rattus* (which is not the case according to Tate) they are not always suppressed in Indo-Malayan *Rattus*. It becomes clear that this genus, if retained, will have to be based on characters other than those of Thomas. All Thomas's subgenera have been given full generic rank recently. I do not think that the groups typified by *Gyomys* and *Leggadina* are congeneric with the present genus.

CHARACTERS.—Generally the skull is more constricted in the frontal region than is the case in *Rattus*, being most constricted in *P. australis*, which gives a percentage against the occipitonasal length of only 11 per cent, or lower than any other species of the present section measured. While this is general, it does not appear to be absolutely constant. Front edge of zygomatic plate concave, then sharply cut back above. Infraorbital foramen narrowed in appearance. Incisive foramina large. Bullae medium. Molars not far removed from *Rattus*, but peculiar; T.3 in M.1 much reduced (in the type of *oralis*, an extremely hypsodont form, there is not a trace of this cusp). M.3 not much smaller than M.2. Cusps originally heavy, well marked. In the subgenus *Thetomys* there is a clear and quite large cusp present in front of the anterior lamina of M.1. But this is too variable a character for the group to be given generic rank, as has been done, as traces of this often occur elsewhere, not only in other Australian genera, but in *Rattus*, such as some specimens seen of *R. norvegicus*; besides, it may be present or absent in Indian *Mus* (subgenus *Leggadilla*).

Fur soft. Tail well haired, the hairs more or less concealing the scales. Ear often enlarged. Hindfoot not abnormal, but in some cases more lengthened than is usual. In the subgenus *Thetomys*, the ear is relatively shorter, and the hindfoot less lengthened than in *Pseudomys*; but very few specimens bearing measurements are available.

The main constant character separating this genus from *Rattus* is the specialized condition of the anterior border of the zygomatic plate, which so far as seen never occurs in *Rattus*, and is very rare in the *Rattus* section of the subfamily, occurring only in *Dasymys*, *Hadromys*, and sometimes in *Aethomys* and *Thallomys namaquensis*. But taken altogether, the skull and molars and external characters of the group seem to be distinct from *Rattus* and other genera.

Forms seen: *auritus*, *australis*, *ferculinis*, *gouldi*, *gracilicaudatus*, *higginsi*, *lineolatus*, *minnie*, *murinus*, *nanus*, *oralis*, *praeconis*, *shortridgei*.

List of Named Forms

Subgenus *Pseudomys*, Gray

1. PSEUDOMYS AUSTRALIS AUSTRALIS, Gray

1832. Proc. Comm. Zool. Soc. London, p. 39.
Liverpool Plains, New South Wales.
Synonym: *lineolatus*, Gould, 1845, Proc. Zool. Soc. London, p. 77.
Darling Downs, New South Wales.
murinus, Gould, 1845, Proc. Zool. Soc. London, p. 78.
Mamoi Plains, New South Wales.

2. PSEUDOMYS AUSTRALIS ORALIS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 621.
Coast of New South Wales.

3. PSEUDOMYS MINNIE MINNIE, Troughton

1932. Rec. Austral. Mus. XVIII, p. 287.
Minnie Downs, north-east of S. Australia.

4. PSEUDOMYS MINNIE FLAVESCENS, Troughton

1936. Mem. Queensland Mus. 11, p. 19.
Barcarolle Station, 135 miles south of Longreach, Queensland.

5. PSEUDOMYS RAWLINNAE, Troughton

1932. Rec. Austral. Mus. XVIII, p. 289.
Rawlinna, W. Australia.

6. PSEUDOMYS AURITUS, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 607.
Lake Albert, S. Australia.

7. PSEUDOMYS SHORTRIDGEI, Thomas

1907. Proc. Zool. Soc. London, 1906, p. 765.
Woyalina, S.-W. Australia.

8. PSEUDOMYS HIGGINSI, Trouessart

1897. Cat. Mamm. 1, p. 473.
Kentishbury, Tasmania.
Synonym: *leucopus*, Higgins & Petterd, 1882, Pap. Proc. Roy. Soc. Tasmania, p. 174.

Subgenus *Thetomys*, Thomas

9. PSEUDOMYS GRACILICAUDATUS, Gould

1845. Proc. Zool. Soc. London, p. 77.
Darling Downs, S. Queensland.

10. PSEUDOMYS GOULDII, Waterhouse

1839. Zool. Voy. Beagle, 1, Mamm. p. 67.
New South Wales.

11. PSEUDOMYS NANUS, Gould

1858. Proc. Zool. Soc. London, 1857, p. 243.
Victoria Plains, New South Wales.

12. PSEUDOMYS PRAECONIS, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 608.
Shark's Bay, W. Australia.

13. PSEUDOMYS FERCULINUS, Thomas

1902. Ann. Mag. Nat. Hist. 7, X, p. 491.
Barrow Island, W. Australia.

Genus 42. APOMYS, Mearns

1905. Apomys, Mearns, Proc. U.S. Nat. Mus. XXVIII, p. 455.

Type Species.—*Apomys hylocoetes*, Mearns.

Range.—Philippine Islands.

Number of Forms.—Nine.

Characters.—Molars exactly as in *Melomys*, third molar reduced in a similar manner; cusps obliterated; last lamina of M.1 broad. Mammae 0—2 = 4, as in *Melomys*. Skull like that of *Paramelomys*, also showing some approximation to the *Rattus verecundus* group. Size rather small; foot longer than is usual; tail as *Rattus*. The genus connects *Melomys* with *Rattus* so closely that probably both *Apomys* and *Melomys* should be referred to *Rattus*. The palate is a little longer posteriorly than in *Melomys*. In the genus I include *Rattus datae*, which cranially and dentally seems indistinguishable from *A. insignis*. The zygomatic plate is straight anteriorly.

Forms seen: *datae*, *insignis*.

List of Named Forms

1. APOMYS DATAE, Meyer
1899. Abh. Mus. Dresden, VII, 7, p. 25.
Lepanto, N. Luzon, Philippine Islands.

2. APOMYS BENGUETENSIS, Hollister
1913. Proc. U.S. Nat. Mus. XLVI, p. 323.
Benguet, Luzon, Philippines.
(Described as near *datae*.)

3. APOMYS HYLOCOETES, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 456.
Mt. Apo, S. Mindanao, Philippines.

4. APOMYS INSIGNIS INSIGNIS, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 459.
Mt. Apo, S. Mindanao, Philippines.

5. APOMYS INSIGNIS BARDUS, Miller
1911. Proc. U.S. Nat. Mus. XXXVIII, p. 402.
Mt. Bliss, Mindanao, Philippines.

6. APOMYS PETRAEUS, Mearns
1905. Proc. U.S. Nat. Mus. XXVIII, p. 458.
Mt. Apo, Mindanao, Philippines.

7. APOMYS MAJOR, Miller
1911. Proc. U.S. Nat. Mus. XXXVIII, p. 402.
Mt. Santo Tomas, Baguio, Benguet, Luzon, Philippines.

8. APOMYS MUSCULUS, Miller
1911. Proc. U.S. Nat. Mus. XXXVIII, p. 403.
Baguio, Benguet, Luzon, Philippines.

9. APOMYS MICRODON, Hollister
1913. Proc. U.S. Nat. Mus. XLVI, p. 327.
Biga, Cataduanes, Philippines.

Genus 43. MELOMYS, Thomas

1922. MELOMYS, Thomas, Ann. Mag. Nat. Hist. 9, IX, p. 261.
1936. POGONOMELOMYS, Rümmler, Zeitschr. für Säugetierk. II, p. 248. (*Melomys mayeri*, Rothschild & Dollman.)
1936. PARAMELOMYS, Rümmler, Zeitschr. für Säugetierk. II, p. 248. (*Uromys levipes*, Thomas.) Valid as a subgenus.
1922. SOLOMYS, Thomas, Ann. Mag. Nat. Hist. 9, IX, p. 261. (*Uromys sapientis*, Thomas.) Valid as a subgenus.
1935. UNICOMYS, Troughton, Rec. Austral. Mus. XIX, 4, p. 259. (*Unicomys ponceleti*, Troughton.) Not seen. (=*Solomys*, *fide* Rümmler.)

TYPE SPECIES.—*Uromys rufescens*, Alston.

RANGE.—Australasian: Talaud Island, Obi Island, New Guinea, Ceram, Solomon Islands; Queensland, Northern Territory (Australia), Melville Island.

NUMBER OF FORMS.—As here understood the genus contains about fifty-three forms.

CHARACTERS.—Before dealing with the characters, a few remarks are necessary on the status of the *Uromys* genera, from which genus the present group was originally divided, and the several subgeneric or generic names which have been given to forms included in the series. The genus *Uromys* was erected by Peters, with a short note to the effect that it was very closely related to "*Mus*" (= *Rattus*, this about the clearest part of the genus diagnosis), but differed in the scales of the tail not being similar, and the skull, which had small bullae and small incisive foramina. While this is true for typical *Uromys*, a host of smaller intermediate forms have been described, referred firstly to *Uromys* and then to the present genus, in which the bullae are certainly not smaller than in some *Rattus*, nor are the incisive foramina.

Flower & Lydekker summarized *Uromys* by saying that it was like *Mus*, but the "scales of the tail not overlapping, but set edge to edge, so as to form a sort of mosaic work." But this character though it may be constant in *Melomys*, is certainly not unknown in *Rattus*, the complex-toothed *R. nativittatus* for instance being quite as in *Uromys* so far as its tail structure shows; and I am not persuaded that this character alone will not have intermediate forms, both in *Rattus*, and apparently to a certain degree within *Melomys*. As regards dentition, Tate states that "an attempt has been made to choose some definite characters for distinguishing the *Uromys* Rats from the *Rattus* Rats, but the results are disappointing, as the two groups overlap in almost every character . . . in no characters of the teeth is the demarcation between the two sets of genera absolute." It appears therefore that *Melomys* is not distinguishable from *Rattus* except on average characters, and that *Uromys* is very closely connected with *Rattus* through *Melomys*, and, that bearing this in mind, the fewer genera admitted in this branch of the subfamily the better. It may be noted that whereas the tail of *Uromys* is strictly naked in all cases, it is not so in *Melomys*; Tate shows that several forms of *Melomys* retain three hairs per scale (*moncktoni* and *mayeri* quoted, p. 590, also *muscalis*, *lutillus* and *sevia*), which is frequently the case in *Rattus*).

Rümmler in his revision of the genus states that *Melomys* is just as nearly allied to *Rattus* and "*Stenomys*" as to *Uromys*, but gives no detailed generic characters.

"The palate ridges, where known, consist of five or six interdental ridges, as well as simple predental ridges" (Thomas; compare *Uromys*). Lower incisors not deep in proportion to their breadth. Rostrum rather heavy. Zygomatic plate with anterior border slightly cut back above. Supraorbital ridges weak or absent; braincase usually rather broader than *Uromys*. Back of palate sometimes broadened, terminating about at posterior part of M.3, or slightly in front of it. The dentition is of the *Uromys* type, strictly simple throughout life apparently; the cusps on each lamina fuse together, and in no case, so far as examined, are clearly marked. M.3 is strongly reduced, and with wear sometimes becomes simple ring-shaped. M.1 appears four-rooted in a few specimens examined. Lower molars with the terminal heel of M.1 and M.2 large, sometimes nearly appearing as an extra lamina; there is a tendency for the front lamina of lower M.1 to be strongly reduced, or even to disappear. The breadth of the posterior lamina in M.1 (upper series) in many specimens suggests that in this tooth the posterointernal cusp is not fully suppressed. The bullae normally are strongly reduced.

Feet, in the typical subgenus, of *Uromys* type, rather heavy, with D.5 relatively long; arboreal in appearance. Tail usually as in *Uromys*; but, as indicated above, the hairiness is in some forms more apparent than in the majority, in which the tail is mostly naked. Size always smaller than *Uromys*.

"*Pogonomelomys*" was based, as a subgenus, on those forms in which the scales of the tail are six-sided, and the molars slightly narrowed; but slightly narrowed or slightly broadened molars will occur side by side in any large genus. The character of the "six-sided" as against "four-sided" tail scales is altogether too slight for subgeneric recognition. It must be noted that in Tate's figures, *mollis* and *lutillus* both appear to have the scales more or less six-sided, as well as *mayeri*. Yet according to Rümmler, *lutillus* is a *Melomys* s.s., *mollis* a *Paramelomys*, and *mayeri* a *Pogonomelomys*.

Paramelomys differs from true *Melomys* in the longer, more pointed rostrum (becoming transitionary towards *Apomys*), with nasals projecting more anteriorly; the hindfoot is long and narrow, though with the usual arrangement of digits. It should perhaps be regarded as a specific group rather than as a subgenus. So far as seen, M.3 is usually ringshaped in adult, in this group.

Solomys has rather large bullae (for the genus); the size is larger than in *Melomys* and *Paramelomys* (about 250 head and body) (*ponceleti* to 330, according to Rümmler); the anterior zygomatic plate is nearly straight, the supraorbital ridges quite well developed; small squamosal crests are suggested in the few skulls seen; palate length and lower incisors agreeing with *Melomys* rather than *Uromys*. Rümmler refers this to *Melomys* as a subgenus, though Tate is inclined to regard it as a subgenus of *Uromys*. It does not seem quite typical in either, and in many characters is intermediate between the two.

So far as known, the mammary formula of *Melomys* is 0—2 = 4.

Forms seen: *aerosus*, *arcium*, *arfakianus*, *arfakiensis*, *australis*, *banfieldi*, *bruijnii*, *calidior*, *caurinus*, *cervinipes*, *clarus*, *dollmani*, *eboreus*, *fraterculus*, *fulgens*, *fuscus*, *gracilis*, *intermedius*, *lanosus*, *levipes*, *lorentzii*, *lutillus*, *meyeri*, *meeki*, *melicus*, *mollis*, *moncktoni*, *murinus*, *muscalis*, *naso*, *obiensis*, *porculus*, *platyops*, *rattoides*, *rubex*, *rubricola*, *rufescens*, *rutilus*, *sapientis*, *shawmayeri*, *stalkeri*, *talaudium*.

In some forms of *Melomys* the toothrow appears to be longer than is usual in *Rattus*.

In the subgenus *Melomys* (including "*Pogonomelomys*"), *M. porculus* stands apart from the others on account of its large size (head and body 220).

The narrow-toothed forms referred by Rümmler to *Pogonomelomys* are listed below as *bruijnii* group.

List of Named Forms

(The classification of Rümmler, 1936, is followed in part.)

Subgenus *Paramelomys*, Rümmler

1. MELOMYS AEROSUS, Thomas

1920. Ann. Mag. Nat. Hist. 9, VI, p. 428.
Mt. Manusela, Ceram.

2. MELOMYS LEVIPES LEVIPES, Thomas

1897. Ann. Mus. Civ. Stor. Nat. Genova, 2, XVIII, p. 617.
Haveri, British New Guinea.

3. MELOMYS LEVIPES LORENTZII, Jentink

1908. Nova Guinea, 9, p. 8.
Rest Camp, 900 m., Noord River, Dutch New Guinea.
Synonym: *naso*, Thomas, 1911, Ann. Mag. Nat. Hist. 8, VII, p. 386.
Kafari River, S.-W. New Guinea.

4. MELOMYS LEVIPES RATTOIDES, Thomas

1922. Ann. Mag. Nat. Hist. 9, IX, p. 263.
Mamberano River, Dutch New Guinea.

5. MELOMYS LEVIPES ARFAKIANUS, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 107.
Arfak Mountains, Dutch New Guinea.

6. MELOMYS LEVIPES WEYLANDI, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 107.
Kunupi, Weyland Range, Dutch New Guinea.

7. MELOMYS LEVIPES CLARAE, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 108.
Sumuri, Weyland Range, Dutch New Guinea.

8. MELOMYS LEVIPES MOLLIS, Thomas

1913. Ann. Mag. Nat. Hist. 8, XII, p. 210.
Utakwa River, Dutch New Guinea.

9. MELOMYS LEVIPES MEEKI, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 108.
Head of Aroa River, British New Guinea.

10. MELOMYS LEVIPES STEVENSI, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 109.
Morobe, Mt. Misim, E. New Guinea.

11. MELOMYS LEVIPES SHAWMAYERI, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 109.
Buntibasa district, Kratke Mountains, New Guinea.

12. MELOMYS LEVIPES LANOSUS, Thomas

1922. Ann. Mag. Nat. Hist. 9, IX, p. 263.
Doormanpadbivak, Mamberano River, Dutch New Guinea.

13. MELOMYS MONCKTONI MONCKTONI, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIV, p. 399.
N.-E. British New Guinea.
Synonym: *platyops*, Thomas, 1906, Ann. Mag. Nat. Hist. 7, XVII, p. 327. Head of Aroa River.

14. MELOMYS MONCKTONI INTERMEDIUS, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 110.
Camp 3, Utakwa River, Dutch New Guinea.

15. MELOMYS MONCKTONI FUSCUS, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 110.
Prauwen-bivak, Idenburg Range, New Guinea.

16. MELOMYS MONCKTONI ARFAKIENSIS, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 111.
Arfak Mountains, Dutch New Guinea.

17. MELOMYS MONCKTONI STEINI, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 111.
Sumuri, Weyland Range, Dutch New Guinea.

18. MELOMYS MONCKTONI SHAWI, Tate & Archbold

1935. Amer. Mus. Nov. 803, p. 2.
Weyland Range, Dutch New Guinea.

19. MELOMYS MONCKTONI RUTILUS, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 112.
Utakwa River, Camp 9, Dutch New Guinea.

20. MELOMYS MONCKTONI TAFA, Tate & Archbold

1935. Amer. Mus. Nov. 803, p. 1.
Mt. Tafa, British New Guinea.

21. MELOMYS MONCKTONI ALLENI, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 112.
Morobe, Mt. Misim, E. New Guinea.

22. MELOMYS MONCKTONI CLARUS, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 113.
Buntibasa district, Kratke Mountains, New Guinea.

23. MELOMYS MONCKTONI STRESEMANNI, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 113.
Kulungtufu, Saruwaged Range, New Guinea.

24. MELOMYS MONCKTONI POHLEI, Rümmler

1935. Zeitschr. für Säugetierk. 10, p. 114.
Hunstein Mountains, New Guinea.

25. MELOMYS MONCKTONI RUBEX, Thomas

1922. Ann. Mag. Nat. Hist. 9, IX, p. 263.
Doormanpadbivak, Mamberano River, Dutch New Guinea.

26. MELOMYS MONCKTONI JOBIENSIS, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 114.
Mountains of Japen Island, New Guinea.

Subgenus *Melomys*, Thomas

porculus Group

27. MELOMYS PORCULUS, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIV, p. 400.
Aola, Guadalcanar, Solomon Islands.

cervinipes Group

28. MELOMYS LUTILLUS LUTILLUS, Thomas

1913. Ann. Mag. Nat. Hist. 8, XII, p. 216.
Angabunga River, S.-E. New Guinea.

29. MELOMYS LUTILLUS MUSCALIS, Thomas

1913. Ann. Mag. Nat. Hist. 8, XII, p. 217.
Fly River, S. New Guinea.

30. MELOMYS LUTILLUS HINTONI, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 106.
Lake Sentani, New Guinea.

31. MELOMYS LUTILLUS MURINUS, Thomas

1913. Ann. Mag. Nat. Hist. 8, XII, p. 216.
Murray Island, Torres Straits.

32. MELOMYS LUTILLUS AUSTRALIUS, Thomas

1924. Ann. Mag. Nat. Hist. 9, XIII, p. 298.
Piara, Cape York, N. Queensland.

33. MELOMYS RUFESCENS RUFESCENS, Alston

1877. Proc. Zool. Soc. London, p. 124.
Duke of York Island, between New Britain and New Ireland.
Synonym: *stalkeri*, Thomas, 1094, Ann. Mag. Nat. Hist. 7, XIV, p. 202. Gira River, British New Guinea.
stalkeri calidior, Thomas, 1911, Ann. Mag. Nat. Hist. 8, VII, p. 387. Mimika River, Dutch New Guinea.
musavora, Ramsay, 1877, Proc. Linn. Soc. N. S. Wales, II p. 16. Duke of York Island.
sexplicatus, Jentink, 1907, Nova Guinea, 5, p. 366. Sentani Lake, New Guinea.
bougainville, Troughton, 1936, Rec. Austr. Mus. 19, p. 344. Buin district of Bougainville, Solomon Islands.

34. MELOMYS RUFESCENS GRACILIS, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 328.
Angabunga River, S.-E. New Guinea.

35. MELOMYS RUFESCENS DOLLMANI, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 106.
Buntibasa district, Kratke Mountains, New Guinea.

36. MELOMYS LEUCOGASTER LEUCOGASTER, Jentink

1908. Nova Guinea, 9, p. 9.
Alkmaar, Noord River, Dutch New Guinea.
Synonym: *latipes*, Tate & Archbold, 1935, Amer. Mus. Nov. 803, p. 3. Baroka, Central district, Papua.

37. MELOMYS LEUCOGASTER ARCIUM, Thomas

1913. Ann. Mag. Nat. Hist. 8, XII, p. 214.
Russell Island, Louisdale Archipelago.

38. MELOMYS LEUCOGASTER FULGENS, Thomas

1920. Ann. Mag. Nat. Hist. 9, VI, p. 426.
Teloeti Bay, Ceram.

39. MELOMYS LEUCOGASTER TALAUDIUM, Thomas

1921. Treubia, II, p. 112.
Liroeng, Talaud Islands.

40. MELOMYS LEUCOGASTER CAURINUS, Thomas

1921. Treubia, II, p. 112.
Talaud Islands, between Gilolo and Mindanao.

41. MELOMYS OBIENSIS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 208.
Obi Island, Moluccas.

42. MELOMYS CERVINIPES CERVINIPES, Gould

1852. Mamm. Austr. pt. IV, vol. III, pl. XIV.
Stradbroke Island, Moreton Bay, S. Queensland.
Synonym: (?) *mixtus*, Troughton, 1935, Rec. Austral. Mus. XIX, 4, p. 257. Groote Eylandt, Gulf of Carpentaria.

43. MELOMYS CERVINIPES LITTORALIS, Lönnberg

1916. K. Svenska Vet. Akad. Handl. Stockholm, 52, 2, p. 5.
Russell River, N. Queensland.
Synonym: *littoralis insulae*, Troughton & Le Soeuf, 1929, Austr. Zool. VI, p. 96. Hinchinbrook Island, N. Queensland.
cervinipes pallidus, Troughton & Le Soeuf, 1929, Austr. Zool. VI, p. 97. Hinchinbrook Island, N. Queensland.
limicauda, Troughton, 1935, Rec. Austral. Mus. XIX, 4, p. 255. Hayman Island, Whitsunday Group, N. Queensland.

44. MELOMYS CERVINIPES MELICUS, Thomas

1913. Ann. Mag. Nat. Hist. 8, XII, p. 215.
Melville Island, N. Australia.

45. MELOMYS CERVINIPES BANFIELDI, de Vis

1907. Ann. Queensland Mus. VII, p. 8.
Dunk Island, Queensland.

46. MELOMYS CERVINIPES EBOREUS, Thomas

1924. Ann. Mag. Nat. Hist. 9, XIII, p. 297.
Ravenshoe, N. Queensland.

47. MELOMYS CERVINIPES RUBICOLA, Thomas

1924. Ann. Mag. Nat. Hist. 9, XIII, p. 298.
Bramble Key, Torres Straits, N. Australia.

bruijnii Group

48. MELOMYS MAYERI, Rothschild & Dollman

1933. Proc. Zool. Soc. London, p. 214.
The Gebroeders, Weyland Range, Dutch New Guinea.

49. MELOMYS BRUIJNII, Peters & Doria

1876. Ann. Mus. Civ. Stor. Nat. Genova, VIII, p. 336.
Salawatti, New Guinea.

50. MELOMYS SEVIA, Tate & Archbold

1935. Amer. Mus. Nov. 803, p. 3.
Cromwell Mountains, Mandated Territory, New Guinea.

51. MELOMYS FRATERCULUS, Thomas

1920. Ann. Mag. Nat. Hist. 9, VI, p. 428.
Mt. Manusela, Ceram.

Subgenus *Solomys*, Thomas

52. MELOMYS SAPIENTIS, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 446.
Solomon Islands.
Synonym: *salebrosus*, Troughton, 1936, Rec. Austr. Mus. 19, p. 346.
Bougainville Island, Solomons.

According to Tate, this species should be known as *salamonis*, Ramsay, 1883, Proc. Linn. Soc. New South Wales, VII, p. 43, Solomon Islands; see also remarks under *Uromys*, no. 10. This name should be regarded as unidentifiable.

53. MELOMYS PONCELETI, Troughton

1935. Rec. Austral. Mus. XIX, no. 4, p. 260.
Bougainville, Solomon Islands.

Genus 44. UROMYS, Peters

1867. Uromys, Peters, Monatsb. K. Preuss. Akad. Wiss. Berlin, p. 343.
1867. Gymnomys, Gray, Proc. Zool. Soc. London, p. 597.
1910. Cyromys, Thomas, Ann. Mag. Nat. Hist. 8, VI, p. 507. (*Mus imperator*, Thomas.)

Type Species.—*Mus macropus*, Gray = *Hapalotis caudimaculatus*, Krefft.

Range.—Australasian: New Guinea, Waigeu Island, Solomon Islands, New Britain, Aru Islands, Kei Islands, Queensland.

Number of Forms.—Ten are recognized by Rümmler.

Characters.—*Uromys* as restricted by Thomas contains the larger species of the group. The skull is as a rule not unlike that of larger species of *Rattus*. The supraorbital ridges are, however, very weak in proportion to the size of the animal. The braincase relatively narrow. Anterior portion of zygomatic plate slightly cut back above. Zygoma normal, with short jugal; rostrum moderate. Sometimes the frontal region shows signs of inflation. Posterior part of palate broad, ending just behind M.3. Bullae very small indeed in all cases, so far as seen (9 per cent or 10 per cent of occipitonasal length, or perhaps less). Incisive foramina situated far in front of toothrows and strongly shortened (constant in all forms seen). "Palate ridges where known twelve or more, besides the usual predental ones" (Thomas; it may be noted that Tullberg gives three anterior, five posterior ridges for *Rattus rattus* and *R. norvegicus*). Lower incisors deep in proportion to their breadth.

Molars of all seen strictly simple, the cusps obsolete and merged into each other on each lamina; the laminae, however, are curved to a degree. Even in very young specimens, more or less cutting, the cusps are not much more developed than in adult. M.3 reduced. Lower molars with large terminal heel present in M.1 and M.2. The anterior lamina of first lower molar usually narrowed and reduced. M.1 appears three-rooted, or four-rooted in one case. M.1 originally with traces of what might be taken as a vestigial posterointernal cusp, as in *Melomys*. Tate suggested that "*Cyromys*" may be synonymized with *Uromys*; and Rümmler has synonymized it. This classification appears correct. Small squamosal crests are suggested in the species (*imperator* and *rex*) referred to the group by Thomas. In *U. neobritannicus* (not seen), as figured by Tate, there are large well-developed squamosal processes.

Mammae 0—2 = 4. Externally large, to 355 mm. head and body length. Claws large; feet of all species seen of arboreal type, heavy and broad, with D.5 hindfoot relatively long. D.4 sometimes slightly longer than D.3. Tail almost entirely devoid of hair, and the scales not overlapping, but always of mosaic pattern so far as seen.

Three groups might be recognized in this genus (basing the classification on that of Rümmler):

neobritannicus group, with squamosal crests well developed (very large form).
caudimaculatus group, without squamosal crests, ears longer (Rümmler), colour of back brown; *anak* (larger), and *caudimaculatus* (smaller).
imperator group, without large squamosal crests; ears shorter (Rümmler); colour of back grey; *imperator* (larger), and *rex* (smaller).

Forms seen: *anak*, *aruensis*, *ductor*, *imperator*, *macropus*, *multiplicatus*, *nero*, *prolixus*, *rex*, *rothschildi*, *scaphax*, *sherrini*, *siebersi*, *validus*.

List of Named Forms

neobritannicus Group

1. UROMYS NEOBRITANNICUS, Tate & Archbold

1935. Amer. Mus. Nov. 803, p. 4.
New Britain.

caudimaculatus Group

2. UROMYS ANAK, Thomas

1907. Ann. Mag. Nat. Hist. 7, XX, p. 72.
Ifogi, Brown River, N.-E. New Guinea.
Synonym: *rothschildi*, Thomas, 1912, Nov. Zool. XIX, p. 91. Rawlinson Mountains, Huon Peninsula, New Guinea.

3. UROMYS CAUDIMACULATUS CAUDIMACULATUS, Krefft

1867. Proc. Zool. Soc. London, p. 316.
Cape York, N. Queensland.
Synonym: *macropus*, Gray, 1866, Proc. Zool. Soc. London, p. 221, Port Albany, Cape York. Not of Hodgson.
exilis, Troughton & Le Soeuf, 1929, Austral. Zool. VI, p. 98. Hinchinbrook Island, N. Queensland.

4. UROMYS CAUDIMACULATUS VALIDUS, Peters & Doria

1881. Ann. Mus. Civ. Stor. Nat. Genova, 1, XVI, p. 703.
Katau River, New Guinea.
Synonym: *papuanus*, Meyer, 1876, Ann. Mag. Nat. Hist. XVII, p. 145. (nom. nud.).
multiplicatus, Jentink, 1907, Nova Guinea, 5, p. 367. Sentani Lake, New Guinea.
waigeuensis, Frechkop, 1932, Bull. Mus. R. Hist. Nat. Belge, 8, no. 28, p. 11. Waigiou.
nero, Thomas 1913, Ann. Mag. Nat. Hist. 8, XII, p. 208. Camp 3, Utakwa River, Dutch New Guinea.
scaphax, Thomas, 1913, Ann. Mag. Nat. Hist. 8, XII, p. 209. Lower Setakwa River, Dutch New Guinea.
prolixus, Thomas, 1913, Ann. Mag. Nat. Hist. 8, XII, p. 213. Haveri, British New Guinea.

5. UROMYS CAUDIMACULATUS BARBATUS, Milne-Edwards

1900. Bull. Mus. Paris, VI, p. 167.
Aroa River, New Guinea.
Synonym: *ductor*, Thomas, 1913, Ann. Mag. Nat. Hist. 8, XII, p. 213. Avera, Aroa River, British New Guinea.

6. UROMYS CAUDIMACULATUS SHERRINI, Thomas

1923. Ann. Mag. Nat. Hist. 9, II, p. 171.
Ravenshoe, N. Queensland.

7. UROMYS CAUDIMACULATUS ARUENSIS, Gray

1873. Ann. Mag. Nat. Hist. 4, XII, p. 418.
Aru Islands.

8. UROMYS CAUDIMACULATUS SIEBERSI, Thomas

1923. Treubia, III, p. 422.
Gunung Daab, Great Kei, Kei Islands.

imperator Group

9. UROMYS IMPERATOR, Thomas

1888. Ann. Mag. Nat. Hist. 6, I, p. 157.
Aola, Guadalcanar, Solomon Islands.

10. UROMYS REX, Thomas

1888. Ann. Mag. Nat. Hist. 6, I, p. 157.
Aola, Guadalcanar, Solomon Islands.
According to Rümmler this species should be known as *salamonis*, Ramsay, 1883, Proc. Linn. Soc. N. S. Wales, VII, p. 43. See remarks under *Melomys*, number 52.

Genus 45. COELOMYS, Thomas

1915. COELOMYS, Thomas, Journ. Bombay Nat. Hist. Soc. XXIII, p. 414.

TYPE SPECIES.—*Coelomys mayori*, Thomas.

Range.—Ceylon.

Number of Forms.—Two.

Characters.—This genus appears to me to be generically separable from *Rattus* on account of its very strongly reduced M.3, though it may be that certain species of *Rattus* might overlap it. Skull with little interorbital constriction, rather long rostrum and heavy braincase, very weak supraorbital ridges, not unlike that of *Rattus verecundus* group; zygomatic plate cut back above. Bullae rather small. Palatal foramina relatively long. The pattern of the upper molars is moderately simplified, and not unlike that of many *Rattus*; but M.3 is nearly vestigial, more reduced than in some *Mus*, often scarcely larger than the small posterior lamina of M.2. The anterointernal cusp of M.1 shows no signs of excessive inward distortion. Lower teeth not abnormal; M.3 very small. Externally with no special peculiarities; head and body roughly 100 mm.

Forms seen: *mayori*, *bicolor*.

List of Named Forms

1. COELOMYS MAYORI, Thomas

1915. Journ. Bombay Nat. Hist. Soc. XXIII, p. 415.
Pattipola, Highlands of Central Ceylon.

2. COELOMYS BICOLOR, Thomas

1915. Journ. Bombay Nat. Hist. Soc. XXIV, p. 49.
Kottawa, S. Province, Ceylon.

Genus 46. MALACOMYS, Milne-Edwards

1877. Malacomys, Milne-Edwards, Bull. Soc. Philom. Paris, 6, VII, pt. 2, p. 10.

Type Species.—*Malacomys longipes*, Milne-Edwards.

Range.—Central and Western Africa: Liberia; Gaboon, Congo.

Number of Forms.—Four.

Characters.—Skull long and narrow, with long rostrum. Braincase not much wider than rostrum; interorbital constriction little marked. Supraorbital ridges barely traceable. Zygomatic plate not narrowed, slightly cut back above. Incisive foramina short, well open, usually not approaching toothrow. Bullae small. Toothrows strongly reduced. M.1 three-rooted. Cheekteeth not essentially different from a specialized *Rattus*; in adult the cusps of each lamina merge into one another; teeth narrow; M.3 moderately reduced. M.1 with eight cusps; M.2 with six. Lower teeth not abnormal; terminal heel of M.1 and M.2 well developed. Cusps usually obsolete in adult.

Mammae 1—2 = 6. Ear large. Tail long, poorly haired, almost naked in some specimens. Hindfoot narrow, rather long, but so far as ascertainable less lengthened than in *Colomys* (twenty-six specimens average hindfoot 24·68 per cent of head and body length); D.5 quite long; hallux longer than is normal; metatarsals with the same peculiarity as those of *Colomys*.

This genus appears to be closely allied to *Rattus*; it is probable, though not certain, that the character of the metatarsals does not occur in *Rattus*. The toothrow is considerably shortened; averaging 14·8 per cent of the condylobasal length in a few specimens measured, which is usually, but not always, under the measurement for *Rattus*. The highest are over 15 per cent; the lowest, a specimen of *edwardsi*, is only 12·6 per cent, an unusually low measurement, overlapping *Macruromys*.

Two species are recognized by Hayman, the type, and *edwardsi*, which has a considerably narrower interorbital region.

Forms seen: *centralis*, *edwardsi*, *longipes*, *wilsoni*.

List of Named Forms

1. MALACOMYS LONGIPES LONGIPES, Milne-Edwards

1877. Bull. Soc. Philom. Paris, 6, XIII, p. 9.
Gabon, W. Africa.

2. MALACOMYS LONGIPES CENTRALIS, de Winton

1897. Ann. Mag. Nat. Hist. 6, XIX, p. 465.
Tingasi, Monbuttu, N.-E. Congo.

3. MALACOMYS LONGIPES WILSONI, Thomas

1916. Ann. Mag. Nat. Hist. 8, XVIII, p. 238.
Inkongo, Sankuru River, Belgian Congo.

4. MALACOMYS EDWARDSI, Rochebrune

1885. Bull. Soc. Philom. Paris, 7, IX, p. 87.
River Mellacore, Liberia.

Genus 47. HAEROMYS, Thomas

1911. Haeromys, Thomas, Ann. Mag. Nat. Hist. 8, VII, p. 207.

Type Species.—*Mus margarettae*, Thomas.

Range.—Borneo and Celebes.

Number of Forms.—Three.

Characters.—Pygmy Mice, with the hallux said to be opposable (though its claw is not entirely suppressed); described by Thomas as like *Chiropodomys*, but lacking the posterointernal cusp. Braincase very broad and round. Rostrum relatively short. Anterior zygomatic plate straight. Bullae not large. Teeth evidently not abnormal. Toothrow rather short; incisive foramina not long. Feet arboreal; the claw of the hallux is becoming very small; D.5 nearly as long as D.2. Mammae 1—2 = 6 (type species). Hindfoot averaging about 27 per cent head and body length, so far as ascertainable. Head and body, so far as known, not exceeding 77 mm.

Forms seen: *margarettae*, *minahassae*, *pusillus*.

List of Named Forms

1. HAEROMYS MARGARETTAE MARGARETTAE, Thomas

1893. Ann. Mag. Nat. Hist. 6, XI, p. 346.
Penrisen Hills, Sarawak, Borneo.

2. HAEROMYS MARGARETTAE PUSILLUS, Thomas

1893. Ann. Mag. Nat. Hist. 6, XII, p. 232.
Mt. Kina Balu, N. Borneo.

3. HAEROMYS MINAHASSAE, Thomas

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 247.
Rurukan, Minahassa, N. Celebes.

Tate suggests that the genus may be an offshoot of the *Rattus cremoriventer* group; but the species are so very much smaller than any Indo-Malayan *Rattus* that this seems questionable; *Haeromys* must be one of the smallest members of the whole Order.

Genus 48. CHIROMYSCUS, Thomas

1925. Chiromyscus, Thomas, Proc. Zool. Soc. London, p. 503.

Type Species.—*Mus chiropus*, Thomas.

Range.—Burma, Annam.

Number of Forms.—One.

Characters.—Like *Rattus*, but hindfoot with hallux clawless, and fully and widely opposable. Supraorbital ridges strong; braincase broad; bullae small; palatal foramina long; zygomatic plate more or less straight anteriorly; interparietal much enlarged. Dentition like that of a moderately simple-toothed *Rattus*; M.3 is reduced. Hindfoot with large digit pads, D.5 moderately long, and hallux as described above. Tail relatively well-haired, faintly pencilled, longer than head and body. Fur bristly. Head and body up to 160 mm. (in our material).

The genus was included in *Haeromys* by Wroughton, in the Indian Mammal Survey, but does not appear to be allied to that group of Pygmy Mice, and when fresh specimens were obtained in 1925, Thomas formed a new genus for the species. The hallux appears as fully specialized as in *Hapalomys*, *Chiropodomys* and others; I have never seen this character fully developed in any species of *Rattus*, though it is likely that in some of these the hallux will be partly opposable. The mammary formula in *Chiromyscus* is 2—2 = 8 (Osgood).

Forms seen: *chiropus*.

List of Named Forms

1. CHIROMYSCUS CHIROPUS, Thomas

1891. Ann. Mus. Civ. Stor. Nat. Genova, 2, X, p. 884.
Karin Hills, Burma.

Genus 49. ZELOTOMYS, Osgood

1910. Zelotomys, Osgood, Field Mus. Nat. Hist. Publ. Zool. ser. X, 2, p. 7.

Type Species.—*Mus hildegardeae*, Thomas.

Range.—African: Kenya, Congo (Uelle region), North Rhodesia, Angola.

Number of Forms.—Five.

CHARACTERS.—Skull with considerable interorbital constriction, no supraorbital ridges; braincase rather short; interparietal relatively small. Palatal foramina very long, penetrating between front molars. Bullae medium. Anterior part of zygomatic plate more or less straight, as a rule.

Upper incisors long, strongly pro-odont. Molars strongly cuspidate, with the outer row well developed, and projecting strongly outwards, and the laminae rather broad in appearance. M.2 about as broad as long, or broader than long. M.1 longer than M.2+M.3. M.3 strongly reduced, narrower than M.2. There is no inward distortion of T.1 in M.1. M.1 with eight cusps, M.2 with six. Lower teeth not abnormal; M.3 small. Lower incisor root showing more on outer side of mandible than is usual.

Externally with no special peculiarities; digits normal; tail shorter than head and body; moderately haired; mammae 3—2 = 10.

From all allied *Rattus*-type or *Arvicanthis*-type Rats from Africa, this genus is well distinguished by its pro-odont incisors, compared with a rather peculiar dentition which is not easy to define, but quite apparent. From the few species of *Rattus* with pro-odont incisors (*berdmorei* group) it is distinguished by its more cuspidate, less simple cheekteeth pattern, the cusps being in the *berdmorei* group, so far as ascertainable, much less well marked, the teeth relatively much narrower, the general effect simpler, and the toothrow relatively considerably shorter (14–16 per cent of condylobasal length as against 18 or 19 per cent in *Zelotomys*).

Forms seen: *hildegardeae*, *instans*, *kuvelaiensis*, *shortridgei*.

The species are very closely allied, and may later be regarded all as races of the type.

LIST OF NAMED FORMS

1. ZELOTOMYS HILDEGARDEAE HILDEGARDEAE, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 219.
Machakos, Kenya.

2. ZELOTOMYS HILDEGARDEAE VINACEUS, Heller

1912. Smiths. Misc. Coll. LIX, no. 16, p. 10.
Ndi, Taita Hills, Kenya.

3. ZELOTOMYS INSTANS, Thomas

1915. Ann. Mag. Nat. Hist. 8, XVI, p. 480.
Poko, Upper Welle, Congo.

4. ZELOTOMYS SHORTRIDGEI SHORTRIDGEI, Hinton

1920. Ann. Mag. Nat. Hist. 9, VI, p. 242.
Ndola, N. Rhodesia.

5. ZELOTOMYS SHORTRIDGEI KUVELAIENSIS, St. Leger

1936. Ann. Mag. Nat. Hist. 10, XVII, p. 470.
50 km. above Mupa, Kuvelai River, Mossamedes, Angola.

Genus 50. HYLENOMYS, Thomas

1925. HYLENOMYS, Thomas, Ann. Mag. Nat. Hist. 9, XV, p. 667.

TYPE SPECIES.—*Hylenomys callewaerti*, Thomas.

RANGE.—Described from Luluabourg, South Congo.

NUMBER OF FORMS.—One.

CHARACTERS.—(One skull only seen.) Infraorbital foramen no wider above than below. Supraorbital ridges very faint. Zygomatic plate less angular than in *Mus*. Mandible slender, with coronoid process very low, and ascending ramus low. Incisive foramina narrow and very long. Upper cheekteeth as in most specialized species of *Mus*; T.1 in M.1 excessively distorted inwards, and M.3 vestigial. M.3 lower vestigial.

Tail relatively short; hindfoot narrow, with fifth digit strongly shortened. Head and body 95.

The upper incisors are pro-odont, though not much lengthened.

Forms seen: *callewaerti*.

LIST OF NAMED FORMS

1. HYLENOMYS CALLEWAERTI, Thomas

1925. Ann. Mag. Nat. Hist. 9, XV, p. 668.
Luluabourg, Kasai, S. Congo.

Genus 51. MURICULUS, Thomas

1902. MURICULUS, Thomas, Proc. Zool. Soc. London, p. 314.

TYPE SPECIES.—*Mus imberbis*, Rüppell.

RANGE.—Abyssinia.

NUMBER OF FORMS.—Two.

CHARACTERS.—Like species of *Mus* with moderately specialized toothrow, but upper incisors strongly pro-odont. Braincase rather broad; zygomatic plate and infraorbital foramen as far as ascertainable not abnormal (one damaged skull seen only); M.3 has two laminae traceable, and M.1 has T.1 not extremely distorted inwards. The ascending ramus of the mandible much higher than in *Hylenomys*. External with no special peculiarities; tail rather short; a faint middorsal stripe can be present.

Thomas regarded the genus as near *Lophuromys*; but St. Leger places it in the neighbourhood of *Mus*, where it seems to belong.

Forms seen: *imberbis*.

LIST OF NAMED FORMS

1. MURICULUS IMBERBIS IMBERBIS, Rüppell

1845. Mus. Senckenberg, III, p. 110.
Simien, Abyssinia.

2. MURICULUS IMBERBIS CHILALOENSIS, Osgood

1936. Field Mus. Nat. Hist. Publ. Zool. ser. XX, p. 245.
Mt. Albasso, N.-E. Chilalo Mountains, Arusi, Abyssinia.

Genus 52. MUS, Linnaeus

1758. Mus, Linnaeus, Syst. Nat. 10th ed. I, p. 59.
1837. Leggada, Gray, Charlesworth's Mag. Nat. Hist. I, p. 586. (*Mus booduga*, Gray.)
1917. Tautatus, Kloss, Journ. Nat. Hist. Soc. Siam, II, p. 279. (*Tautatus thai*, Kloss.)
1876. Nannomys, Peters, Monatsb. K. Preuss. Akad. Wiss. Berlin, p. 480. (*Mus* (*Nannomys*) *setulosus*, Peters.)
1896. Pseudoconomys, Rhoads, Proc. Acad. Nat. Sci. Philadelphia, p. 531. (*Mus* (*Pseudoconomys*) *proconodon*, Rhoads.)
1844. Drymomys, Tschudi, Fauna Peruana, p. 178. (*D. parvulus*, Tschudi = *Mus musculus*, Linnaeus.)
1914. Leggadilla, Thomas, Journ. Bombay Nat. Hist. Soc. XXII, p. 682. (*Mus platythrix*, Bennett.) Valid as a subgenus.

Type Species.—*Mus musculus*, Linnaeus.

Range.—Palaearctic (*musculus* group only): throughout Europe, Central Asia, Siberia, most of China, including Mongolia, Japan; Kashmir, Afghanistan, Persia, Egypt, Morocco.

Indo-Malayan (*musculus*, *booduga* and *platythrix* groups): Peninsular India and Ceylon; Sikkim, Nepal, Assam, Burma, Yunnan and Southern China. Siam, Annam. Philippine Islands.

(Races of *Mus musculus*, perhaps introduced, from Java, Celebes, and other islands; also in Australasian area (New Guinea, etc.).)

African (*musculus*, *triton* and *minutoides* groups): Arabia; Sudan, Abyssinia, Somaliland, Kenya, Tanganyika, Uganda; Gold Coast, Nigeria, Cameroons, Congo, Angola; Mozambique and Southern Africa generally, to Cape Province.

Mus musculus has also been introduced, and gained a footing, in America.

Number of Forms.—About a hundred and thirty.

Characters.—"In general like *Epimys* (= *Rattus*), but mechanical scheme of molars modified by elongation of crown of anterior tooth until it forms the main portion of toothrow; M.1 with three roots, its crown decidedly longer than those of two succeeding teeth combined, its first lamina much distorted by the displacement backward of T.1 into line with T.5 and T.6; M.3 small and tending to disappear, in some species without trace of first lamina; upper incisor compressed, set at such an angle that a subapical notch is normally cut in its outer side by action of lower tooth" (Miller). The genus *Mus* was originally restricted to the *musculus* group, and the "*Leggada*" species by Miller, on the above characters, and if it is to be retained as distinct from *Rattus* (which it can be) it must be on these characters of the toothrow. It should be mentioned that I believe in some cases M.1 may not always be "decidedly longer" than M.2 + M.3; also that rarely in *Rattus* this character can be present; also that rarely, species of *Rattus* or closely allied genera may have a very reduced M.3; but the general effect of the "*Mus* type" of toothrow is easily recognized. It must also be stated that the genus cannot be based on size; many species of *Rattus* may be considerably smaller than some of the larger species of *Mus*.

The skull is light, usually rather flat, with supraorbital ridges, in the typical subgenus, very faint, or absent; the muzzle is most often rather short; the infra-orbital foramen normal. Zygomatic plate not narrowed, and with its upper border cut back above. A small masseter knob usually present for muscle-attachment on its lower border. Incisive foramina long, usually penetrating between front molars, but not always, as for instance the Indian *Mus pahari*. Bullae not enlarged, without peculiarities. Pterygoids tending to vary in the different species, rarely highly abnormal, but in the African *tenellus* and *deserti* the space bounded by the hamulars is unusually narrow, and the pterygoid fossae are much flattened, the structure comparable to that of *Millardia gleadowi*. Incisors thin, not pro-odont.

Cheekteeth: T.1 of M.1 much distorted inwards, or distorted to a greater or lesser degree. This tooth with eight cusps. M.2 with usually six cusps, T.1 being all that remains of the front lamina, though a small T.3 may appear. M.3 strongly reduced; in the *musculus* group and some others traces of two laminae are usually present, but in many forms, particularly the pygmy African *minutoides* group, the tooth is ring-shaped in adult, and exceedingly small. According to Taylor it may be absent in the Philippine species *castaneus* (not seen). The anterior root of M.1 often points far forwards. In this tooth, T.4 is usually distorted backwards, as well as T.1. The lower molars are without special peculiarities; M.3 may be minute, particularly in *minutoides* group.

Externally, small, as a rule under 100 mm. head and body; some Indian and African forms are extremely small, and are probably some of the smallest living Rodents. Tail variable in length in the different species, and in the case of *Mus musculus*, individually. Hindfoot narrow as a rule, the outer digits tending to be shortened, D.5 longer than the hallux. Fur may be soft, harsh, or more or less spiny. Mammae 3—2 = 10 in the type species.

Leggadilla is proposed as a genus by Thomas, mainly on the grounds of the presence of well-marked supraorbital ridges; but this is a character which is much too variable in other groups to be regarded as of generic value here, and certain species of *Mus* or "*Leggada*" may have these ridges faintly present. There is in some forms, or specimens, a well-marked cusp present immediately in front of T.2, in M.1; but this character is also variable elsewhere, particularly in Australian genera. The fur may be spiny, as in *M. shortridgei*, which is about the largest species of the genus (head and body to 120). Mammae 3—2 = 10 or 4—2 = 12.

As pointed out by Miller, there are no characters which distinguish "*Leggada*" (tropical species) from *Mus* (*musculus* group). *Leggada* was revived by Thomas on the grounds that the muzzle in the tropical species is usually longer, but he shows that it cannot be taken as constant. "The length of the nasals in *Mus* is generally about equal to the distance from the external edge of one toothrow to the outer side of the zygoma on the opposite side . . . in *Leggada* the nasal length generally decidedly surpasses these two distances . . . every individual skull will not answer to each of these tests, but on the whole there is rarely a case where one is doubtful as to which of the two groups a species should be placed in . . . the most doubtful are the short-tailed Mice known as *algirus* and *spicilegus*, which more approach *Leggada*, and have less of the *musculus* specialization. But on the whole they are best referred to *Mus*, in whose geographical area they occur."

"*Tautatus*," Kloss, was erected for a species from Siam. After reading the original genus description, the amended description published later, and comparing the species with other members of *Mus*, I have come to the conclusion that it is an ordinary member of the *booduga* group. This has already been shown by Osgood, Field. Mus. Nat. Hist. Publ. Zool. ser. XVIII, 1932, p. 314.

Nor in my opinion is there the slightest need to regard *Leggada* as anything but a synonym of *Mus*. *Mus* and "*Leggada*" together, as pointed out by Miller many years ago, form a perfectly natural genus.

Groups

The *musculus* group, containing all the Palaearctic forms, are as above indicated rather short-nosed types; the teeth are not extremely specialized, in the manner described above; M.3 is less vestigial than in some pygmy species from the tropics.

Russian authors regard all forms previously regarded as races of *spicilegus*, *wagneri*, *bactrianus*, etc., as races of *musculus*, which seems to be correct. Certainly Miller's characters for *spicilegus* as a distinct species as given in the 'Catalogue of the Mammals of Western Europe,' based on length of tail, do not convince me that this type of Mouse can be regarded as a species; tail length being apparently a highly variable character within *musculus*. The numerous named races of *musculus* are here listed without comment; how many of them are valid, and how many are based on slightly abnormal individual house-mice, I am not in a position to say. The last remarks do not apply to the field-dwelling *bactrianus-spicilegus* members of the group.

The *booduga* group, containing the Indian forms without clear supraorbital ridges, tend as indicated above to be slightly longer-nosed than in the *musculus* group. The teeth may be a little more specialized (M.1 more distorted, M.3 more reduced), though not so in every case. *Mus pahari* seems to be a distinct species, with shorter palatal foramina than is normal, and a rather generalized toothrow.

The *platythrix* group (subgenus *Leggadilla*) contains a number of Indian forms possessing quite well-marked supraorbital ridges; the bodily size becomes largest for the genus; the molars are on the whole least *Mus*-like of all forms in the genus, M.3 being never vestigial, and T.1 in M.1 only moderately distorted.

The *bufo* group, containing also *triton*, from Africa, seem to be rather larger than the majority of the African species of *Mus*, and M.1 has usually less distortion inwards of the anterointernal cusp. M.3 is strongly reduced.

The *minutoides* group, widely distributed in Africa (containing *bellus*, *gratus*, *musculoides*, etc.), contains as a rule very small forms with very highly specialized toothrows, the teeth being the most extreme seen in the genus.

The *tenellus* group is like the last, but apparently with the abnormal pterygoid specialization as described above.

Forms seen: *abbotti*, *algirus*, *annamensis*, *azoricus*, *bactrianus*, *bahadur*, *bellus*, *borealis*, *booduga*, *bufo*, *caroli*, *cervicolor*, *cinderella*, *cooki*, "*darjilingensis*," *decolor*, *deserti*, "*dubius*," *dunni*, *famulus*, *fernandoni*, *fors*, *funereus*, *gallarum*, *gentilis*, *gentilulus*, *gerbillus*, *gondokorae*, *grahami*, *gratus*, *gurkha*, *hannyngtoni*, *haussa*, *hispanicus*, *homourus*, *hortulanus*, *induta*, *jacksoniae*, *jalapae*, *kasaica*, *lusitanicus*, *mahomet*, *manchu*, "*manei*," *marica*, *minutoides*, *molossinus*, "*modestus*," *mongolium*, *muralis*, *murilla*, *musculoides*, *musculus*, *nagarum*, *neavei*, *nitidulus*, *orientalis*, *pahari*, *palnica*, *pasha*, "*pachycercus*," *platythrix*, *popaeus*, *ramnadensis*, *sadhu*, *setulosus*, *shortridgei*, *sibylla*, *sorellus*, *spretus*, *spicilegus*, *suahelicus*, *surkha*, *tenellus*, "*terricolor*," *tomensis*, *triton*, *umbratus*, "*urbanus*," *vicinus*, *wagneri*.

List of Named Forms

Subgenus *Mus*, Linnaeus

1. MUS MUSCULUS MUSCULUS, Linnaeus

1758. Syst. Nat. 1, 10th ed., p. 62.

Upsala, Sweden.

Synonym: *minor*, Klein, 1751, Quadr. disp., p. 57.

sorex, Brisson, 1762, Regn. Anim., p. 119.

poschiavinus, Fatio, 1869. Faune. Vert. Suisse, 1, p. 207. Switzerland.

parvulus, Tschudi, 1844, Fauna Peruana, p. 179. Peru.

musculus nudoplicatus, Campbell, 1907, Zoologist, London, ser. 4, 11, p. 1.

simsoni, Higgins & Petterd, 1883, Papers Proc. Roy. Soc. Tasmania, 1882, p. 175. Tasmania.

albertisi, Peters & Doria, 1880, Ann. Mus. Civ. Stor. Nat. Genova, XVI, p. 702. New Guinea.

adelaidensis, Gray, 1841, Journ. Two Exped. Australia, Grey, 11, app. pp. 404, 410. Adelaide.

modestus, Wagner, 1842, Arch. Naturg. I, p. 14. South Africa.

brevirostris, Waterhouse, 1837, Proc. Zool. Soc. London, p. 19. Uruguay.

(?) *musculus jalapae*, Allen & Chapman, 1897, Bull. Amer. Mus. Nat. Hist. IX, p. 198. Jalapa, Vera Cruz, Mexico.

musculus albus, Bechstein, 1801, Gemeinn. Naturgesch. Deutschl. 1, 2nd ed., p. 955. Germany.

musculus flavus, Bechstein, same reference.

musculus maculatus, Bechstein, same reference.

musculus niger, Bechstein, same reference.

musculus striatus, Billberg, Syn. Fauna Scandinaviae, p. 6, 1827. Sweden.

musculus albicans, Billberg, same reference.

musculus niveus, Billberg, same reference.

musculus helvolus, Fitzinger, Sitz. Ber. Kais. Akad. Wiss. Wien. Math. Nat. Cl. LXI, 1, p. 70, 1867.

musculus varius, Fitzinger, same reference.

(*Mus musculus musculus*) *musculus cinereomaculatus*, Fitzinger, same reference.
musculus flavescens, Fischer, Zool. Garten, 1872, XIII, p. 223. Berlin.
vignaudi, Prevost, 1845, Voy. Lefebvre Zool., p. 24. Abyssinia.
orientalis, Cretzchmar, 1928, Rüppell Atlas, p. 76, pl. 30, Massawa, Ethiopia. Not of Desmarest, 1819. See G. M. Allen.
(?) *praetextus*, Brants, 1827, Muizen, p. 125.
peruvianus, Peale, 1848, U.S. Expl. Exp., p. 51.

2. MUS MUSCULUS JAMESONI, Krausse
1921. Arch. Naturg. Berlin, 87, 6, p. 40.
North Bull Island, Dublin Bay.

3. MUS MUSCULUS FAEROENSIS, Clarke
1904. Proc. Roy. Phys. Soc. Edinburgh, XV, pt. II, p. 163.
Nolsoe, Faroe Islands.

4. MUS MUSCULUS MURALIS, Barrett-Hamilton
1899. Proc. Zool. Soc. London, p. 81.
St. Kilda, Outer Hebrides, Scotland.

5. MUS MUSCULUS AZORICUS, Schinz
1845. Synops. Mamm. II, p. 161.
Azores Islands, E. Atlantic.
Synonym: *mollissimus*, Dehne, 1855, Allgem. Deutsche Nat. Zeitschr. Dresden, 1, p. 443. Italy.

6. MUS MUSCULUS SUBCAERULUS, Fritsche
1928. Zeitschr. für Säugetierk. 3, p. 307.
N. Germany.

7. MUS MUSCULUS CAUDATUS, Martino
1935. Zap. Russk. Nauch. Inst. Belgrade, 10, p. 85.
Bistra Mountains, W. Macedonia, Greece.

8. MUS MUSCULUS SERGII, Valch
1927. Trav. Soc. Nat. Charkov, 50, no. 2, p. 49.
Ukraine, S. Russia.

9. MUS MUSCULUS BOREALIS, Ognev
1924. Rodents of N. Caucasus, p. 52.
Village Upta, Kem subdistrict of Government of Archangelsk.

10. MUS MUSCULUS FUNEREUS, Ognev
1924. Rodents of N. Caucasus, p. 52.
Station Shatilov, Govt. of Tula.

11. MUS MUSCULUS HORTULANUS, Nordmann
1840. Archiv. Naturg. 1, p. 330.
N. Caucasus Mountains, Russia.

12. MUS MUSCULUS FORMOSOVI, Heptner
1930. Zool. Anz. 89, p. 5.
Daghestan, Caucasus, Russia.

13. MUS MUSCULUS NOGAIORUM, Heptner
1934. Folia Zool. hydrob. 6, p. 23.
25 km. north of Kisljar, N. Caucasus.

14. MUS MUSCULUS TATARICUS, Satunin
1908. Mitt. Kaukas Mus. Tiflis, 4, pp. 61, 113.
Bankovsky Promysel, Caspian Sea.

15. MUS MUSCULUS ABBOTTI, Waterhouse
1837. Proc. Zool. Soc. London, p. 77.
Trebizond, Asia Minor.

16. MUS MUSCULUS SEVERTZOWI, Kashkarov
1925. Trans. Sci. Soc. Turkistan, Tashkent, 2, p. 55.
Turkestan.

17. MUS MUSCULUS DECOLOR, Argyropulo
1932. Trav. Inst. Zool. Acad. Sci. U.R.S.S. p. 226.
Almatinsk, Semirechyia, Central Asia.

18. MUS MUSCULUS TOMENSIS, Kastschenko
1899. Results Zool. Exped. to Altai in 1898, p. 46.
Village of Cherga, Tomsk Gouv, Altai.
Synonym: *musculus tomensis*, natio *amurensis*, Argyropulo, 1932, Trav. Inst. Zool. Acad. Sci. U.R.S.S. p. 225.
musculus tomensis morph *rufiventris*, Argyropulo, 1932, same reference.

19. MUS MUSCULUS VARIABILIS, Argyropulo
1932. Trav. Inst. Zool. Acad. Sci. U.R.S.S. p. 225.
Katon-Karagai, 1,000 m. alt., Altai.

20. MUS MUSCULUS RADDEI, Kastschenko
1910. Ann. Mus. Zool. St. Petersb. 15, p. 278.
Transbaikal district.

21. MUS MUSCULUS VINOGRADOVI, Argyropulo
1932. Trav. Inst. Zool. Acad. Sci. U.R.S.S. p. 223.
Yakutsk, Siberia.

22. MUS MUSCULUS FAR, Cabrera
1921. Mem. Real. Soc. Esp. Hist. Nat. Tomo del 50° aniversario, p. 46.
Mogador, Morocco.

23. MUS MUSCULUS CAROLI, Bonhote
1902. Nov. Zool. IX, p. 627.
Liukiu Islands.

24. MUS MUSCULUS HOMOURUS, Hodgson
1845. Ann. Mag. Nat. Hist. XV, p. 268.
Nepal, Himalayas.
Synonym: *dubius*, Hodgson, 1845, Ann. Mag. Nat. Hist. XV, p. 269. Nepal.
urbanus, Hodgson, 1845, Ann. Mag. Nat. Hist. XV, p. 269. Nepal.
tytleri, Blyth, 1859, Journ. Asiat. Soc. Bengal, XXVIII, p. 296.
manei, Gray, 1852, Kelaart, Fauna Zeyl., p. 64. Ceylon.
rama, Blyth, 1865, Journ. Asiat. Soc. Bengal, XXXIV, p. 194.
nipalensis, Hodgson, 1841, Journ. Asiat. Soc. Bengal X, p. 915.
viculorum, Anderson, Zool. Yunnan, 1878, p. 308.

25. MUS MUSCULUS SINICUS, Cabrera
1922. Bol. Real. Soc. Esp. Hist. Nat. XXII, p. 166.
Ning-po, S. China.

26. MUS MUSCULUS OUWENSI, Kloss
1922. Treubia, II, p. 120.
Probolingo, E. Java.

27. MUS MUSCULUS FREDERICAE, Sody
1933. Ann. Mag. Nat. Hist. 10, XII, p. 438.
Poso, Middle Celebes.

28. MUS MUSCULUS GENTILIS, Brants
1827. Geslacht der Muizen, p. 126.
S. Egypt.
Synonym: *pallescens*, Heuglin, Reise N. Ost. Afr. ii, p. 72, 1877.

29. MUS MUSCULUS GENTILULUS, Thomas
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 241.
Aden, S. Arabia.

30. MUS MUSCULUS ALGIRUS, Pomel
1856. C.R. Acad. Sci. Paris, XLII, p. 654.
Algeria.

31. MUS MUSCULUS SPRETUS, Lataste
1883. Act. Linn. Soc. Bord. XXXVII, p. 17.
Algeria.

32. MUS MUSCULUS CANACORUM, Revilliod
1914. Sarassin & Roux, Nova Caledonia Zoologie, 1, p. 364.
New Caledonia.

33. MUS MUSCULUS TAITIENSIS, Fitzinger
1868. Reise Novara. p. 26.
Taiti Islands, Polynesia.

34. MUS MUSCULUS(?) MOHRI
New name for "*Mus mystacinus*," Mohr, 1926, Mitt. Zool. Staatsin. Zool. Mus. Hamburg, 40, p. 77. Not of Danford & Alston.
New Britain.

35. MUS MUSCULUS(?) DUNCKERI, Mohr
1926. Mitt. Zool. Staatsin. Zool. Mus. Hamburg, 40, p. 77.
St. Matthias Island, Bismarck Archipelago.

36. MUS MUSCULUS SPICILEGUS, Petenyi
1882. Termeszetrajzi Fuzetek, Budapest, V, p. 114.
Hungary.
Synonym: *acervator*, *acervifex*, *canicularius*, *caniculator*, all of Petenyi, same reference.

(The following nine races were described as races of *spicilegus*, or have recently been regarded as such.)

37. MUS MUSCULUS LUSITANICUS, Miller
1909. Ann. Mag. Nat. Hist. 8, III, p. 422.
Cintra, Portugal.

38. MUS MUSCULUS HISPANICUS, Miller

1909. Ann. Mag. Nat. Hist. 8, III, p. 421.
Silos, Burgos, Spain.

39. MUS MUSCULUS CAOECII, Krausse

1921. Archiv. für Naturg. Berlin, 89, p. 95.
Sardinia.

40. MUS MUSCULUS HEROLDII, Krausse

1921. Archiv. für Naturg. Berlin, 88, p. 137.
Swinemunde, Pomerania, E. Germany.

41. MUS MUSCULUS GERMANICUS, Noack

1918. Zeitschr. Forst. u. Jagdwesen Berlin, 50, p. 308.
Eberswalde, near Berlin, Germany.

42. MUS MUSCULUS HAPSALIENSIS, Reinwaldt

1927. Act. Com. Univ. Tartu, 12, p. 50.
N.-W. Estonia.

43. MUS MUSCULUS LYNESI, Cabrera

1923. Bol. Real. Soc. Esp. Hist. Nat. XXIII, p. 430.
Jebala, Morocco.

44. MUS MUSCULUS RIFENSIS, Cabrera

1923. Bol. Real. Soc. Esp. Hist, Nat. XXIII, p. 431.
Melilla, Morocco.

45. MUS MUSCULUS MOGREBINUS, Cabrera

1911. Bol. Real. Soc. Esp. Hist. Nat. XI, p. 556.
Taguidert, W. Morocco.

46. MUS MUSCULUS WAGNERI, Eversmann

1848. Bull. Nat. Moscou, 1, p. 191.
Turkestan.
Synonym: *wagneri rotans*, Fortuyn (Waltzing Mice), De cytoarchitect der groote hescnehschors van eenige knaagdiern, Amsterdam, p. 169, 1911. Japan.
pachycercus, Blanford, 1875, Journ. Asiat. Soc. Bengal, 2, p. 108.

(The next three races were described as subspecies of *wagneri*, or have recently been regarded as such.)

47. MUS MUSCULUS SAREPTANICUS, Hilzheimer

1912. Acta Soc. Fauna & Flora Fenn. 34, 1911, p. 14.
Sarepta, Lower Volga, Russia.

48. MUS MUSCULUS MONGOLIUM, Thomas

1908. Proc. Zool. Soc. London, p. 106.
Mongolian Plateau, 100 miles north-west of Kalgan.

49. MUS MUSCULUS MANCHU, Thomas

1909. Ann. Mag. Nat. Hist. 8, IV, p. 502.
Chu Chia Tai, Kirin Province, Manchuria.

50. MUS MUSCULUS SUBLIMIS, Blanford

1879. Yarkand Miss. Mamm. p. 51.
Tankse, west of Pandong Lake, Ladak.

51. MUS MUSCULUS BACTRIANUS, Blyth

1846. Journ. Asiat. Soc. Bengal, XV, p. 140.
Kandahar, Afghanistan.
Synonym: *gerbillinus*, Blyth, 1853, Journ. Asiat. Soc. Bengal, XXII, p. 410.
theobaldi, Blyth, 1853, same reference, p. 583. Punjab.

(The next four races were described as subspecies of *bactrianus*, or have been recently regarded as such.)

52. MUS MUSCULUS YAMASHINAI, Kuroda

1934. Journ. Mamm. Baltimore, 15, p. 234.
Moppo, S. Korea.

53. MUS MUSCULUS GANSUENSIS, Satunin

1903. Ann. Mus. St. Petersb. VII, p. 564.
Tschortentan, Kansu.

54. MUS MUSCULUS TANTILLUS, G. M. Allen

1927. Amer. Mus. Nov. 270, p. 9.
Wanhsien, Szechuan, China.

55. MUS MUSCULUS KAKHYENENSIS, Anderson

1878. Zool. Res. W. Yunnan, p. 307.
Ponsee, S.-W. Yunnan.

56. MUS MUSCULUS MOLOSSINUS, Temminck

1843. Fauna Japonica, p. 51, pl. 15, figs. 2–4.
Japan.

(The following three races were described as races of *molossinus*.)

57. MUS MUSCULUS YESONIS, Kuroda

1928. Journ. Mamm. Baltimore, 9, p. 147.
Uinai, Iburi, Hokkaido, Japan.

58. MUS MUSCULUS ORII, Kuroda

1924. On New Mammals from Riukiu Islands, p. 7. Tokyo.
Riukiu Islands.

59. MUS MUSCULUS YONAKUNI, Kuroda

1924. On New Mammals from Riukiu Islands, p. 8. Tokyo.
Riukiu Islands.

60. MUS KURILENSIS, Kuroda

1924. Journ. Mamm. Baltimore, 5, p. 119.
Shimoshire, Central Kurile Islands.

(Vinogradov, Rodents of U.S.S.R., quotes a form *M. musculus bicolor*, from lower part of Ural River. The reference to this has not been traced.)

booduga Group[1]

61. MUS BOODUGA, Gray

1837. Charlesworth's Mag. Nat. Hist. 1, p. 586.
S. Mahratta, India.
Synonym: *lepidus*, Elliot, 1839, Madras Journ. Linn. Soc. X, p. 216.
terricolor, Blyth, 1851, Journ. Asiat. Soc. Bengal, XX, p. 172.
albidiventris, Blyth, 1852, Journ. Asiat. Soc. Bengal, XXI, p. 351.
dunni, Wroughton, 1912, Journ. Bombay Nat. Hist. Soc. XXI, p. 339. Amballa, Punjab.
fulvidiventris, Blyth, 1852, Journ. Asiat. Soc. Bengal, XXI, p. 351.
darjilingensis, Hodgson, 1849, Ann. Mag. Nat. Hist. 2, III, p. 203.
beavanii, Peters, Proc. Zool. Soc. London, 559, 1866.

62. MUS FAMULUS, Bonhote

1898. Journ. Bombay Nat. Hist. Soc. XII, p. 99.
Coonoor, Nilgiri Hills, S. India.

63. MUS NITIDULUS NITIDULUS, Blyth

1859. Journ. Asiat. Soc. Bengal, XXVIII, p. 294.
Shwe Gyen, Burma.

64. MUS NITIDULUS POPAEUS, Thomas

1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 420.
Mt. Popa, dry zone of Burma.

65. MUS NITIDULUS ANNAMENSIS, Robinson & Kloss

1922. Ann. Mag. Nat. Hist. 9, IX, p. 99.
Dalat, Langbian Plateau, S. Annam.

66. MUS COOKI COOKI, Ryley

1914. Journ. Bombay Nat. Hist. Soc. XXII, p. 664.
N. Shan States, Burma.

67. MUS COOKI MEATOR, G. M. Allen

1927. Amer. Mus. Nov. 270, p. 6.
Taipingpu, Yunnan.

68. MUS PALNICA, Thomas

1923. Journ. Bombay Nat. Hist. Soc. XXIX, p. 87.
Palni Hills, S. India.

69. MUS LEPIDOIDES, Fry

1931. Journ. Bombay Nat. Hist. Soc. XXXIV, p. 921.
Mt. Popa, Burma.

[1] It will be seen that twelve distinct "species" are standing in this group. A perusal of the literature suggests that *booduga*, *pahari*, *nitidulus*, *famulus*, and perhaps *cooki* are valid. (See Wroughton's Key, 1920, J. Bombay Nat. Hist. Soc., XXVI, p. 960). *palnica* is almost certainly a race or synonym of *cooki*; *cervicolor* appears to be a synonym of *booduga*; *jacksoniae* is probably a race of *pahari*; *nagarum* is probably a local race of *booduga*; and *thai* may be a synonym or race of *cooki*.

70. MUS CERVICOLOR, Hodgson
1845. Ann. Mag. Nat. Hist. XV, p. 268.
Nepal.
Synonym: *strophiatus*, Hodgson, 1845, same reference.
cunicularis, Blyth, Journ. Asiat. Soc. Bengal, XXIV, p. 721, 1855.

71. MUS PAHARI PAHARI, Thomas
1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 414.
Sikkim, Himalayas.

72. MUS PAHARI GAIRDNERI, Kloss
1920. Journ. Nat. Hist. Soc. Siam, IV, p. 60.
Me Taw, 40 miles north-west of Raheng, Siam.

73. MUS JACKSONIAE, Thomas
1921. Journ. Bombay Nat. Hist. Soc. XXVII, p. 596.
Khasi Hills, Assam.

74. MUS NAGARUM, Thomas
1921. Journ. Bombay Nat. Hist. Soc. XXVII, p. 597.
Naga Hills, Upper Assam.

75. MUS THAI, Kloss
1917. Journ. Nat. Hist. Soc. Siam, II, p. 280.
Raheng, W. Siam.

76. MUS RAHENGIS, Kloss
1920. Journ. Nat. Hist. Soc. Siam, IV, 2, p. 61.
Me Taw, 40 miles north-west of Raheng, Siam.

bufo-triton Group

77. MUS TRITON TRITON, Thomas
1909. Ann. Mag. Nat. Hist. 8, IV, p. 548.
Kirui, Mt. Elgon, Uganda.
Synonym: *naivashae*, Heller, 1910, Smiths. Misc. Coll. LIV, no. 1924, p. 2. Naivasha, Kenya.

78. MUS TRITON MURILLA, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 91.
Machakos, Kenya.

79. MUS TRITON FORS, Thomas and Wroughton
1910. Trans. Zool. Soc. London, XIX, p. 506.
Butagu Valley, W. Ruwenzori.

80. MUS TRITON SORELLA, Thomas
1909. Ann. Mag. Nat. Hist. 8, IV, p. 548.
Kirui, Mt. Elgon, Uganda.

81. MUS BUFO BUFO, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 145.
East Ruwenzori.

82. MUS BUFO WAMBUTTI, Lonnberg & Gyldenstolpe
1925. Arkiv. Zool. Bd. 17B, no. 5, p. 4.
Ituri Forest, E. Congo.

minutoides Group

83. MUS BELLUS BELLUS, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 87.
Machakos, Kenya.

84. MUS BELLUS VICINUS, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 88.
Takaungu, near Mombasa, Kenya.

85. MUS BELLUS PETILUS, Hollister
1916. Smiths. Misc. Coll. LXVI, no. 10, p. 3.
S. Guaso Nyiro, Kenya.

86. MUS BELLUS GALLARUM, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 88.
Harar, S.-E. Abyssinia.

87. MUS BELLUS GONDOKORAE, Heller
1911. Smiths. Misc. Coll. LVI, no. 17, p. 8.
Gondokoro, N. Uganda.

88. MUS BELLUS ENCLAVAE, Heller
1911. Smiths. Misc. Coll. LVI, no. 17, p. 8.
Rhino Camp, Lado Enclave.

89. MUS BELLUS KASAICUS, Cabrera
1924. Bol. Real. Soc. Esp. Hist. Nat. XXIV, p. 222.
Luluabourg, Kasai, S. Congo.

90. MUS BELLUS SIBYLLA, Thomas
1918. Ann. Mag. Nat. Hist. 9, II, p. 484.
Usolo River, Benguella, Angola.

91. MUS BELLUS MARICA, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 88.
Beira, Portuguese E. Africa.

92. MUS BELLUS INDUTUS, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 89.
Molopo, Bechuanaland.

93. MUS GRATUS GRATUS, Thomas & Wroughton
1910. Trans. Zool. Soc. London, p. 507.
E. Ruwenzori, Mubuku Valley.
Synonym: *gratus sungarae*, Heller, 1911, Smiths. Misc. Coll. LVI, no. 17, p. 7. W. Kenya Forest Station.

94. MUS GRATUS SORICOIDES, Heller
1914. Smiths. Misc. Coll. LXIII, no. 7, p. 10.
Mt. Mbololo, Kenya.

95. MUS MINUTOIDES MINUTOIDES, Smith
1834. South Afr. Quart. Journ. 2, p. 157.
Cape Town.
Synonym: *minimus*, Peters, 1852, Reise nach Mossambique: Säugeth. p. 153. Mozambique. Not of White, 1789 (a *Micromys*).

96. MUS MINUTOIDES UMBRATA, Thomas

1910. Ann. Mag. Nat. Hist. 8, V, p. 86.
Wakkerstroom, S.-E. Transvaal.

97. MUS MINUTOIDES ORANGIAE, Roberts

1926. Ann. Transv. Mus. XI, p. 251.
Viljoen's Drift, Orange Free State. Status *fide* G. M. Allen.

98. MUS MINUTOIDES NEAVEI, Thomas

1910. Ann. Mag. Nat. Hist. 8, V, p. 90.
E. Loangwa district, N.-E. Rhodesia.

99. MUS MUSCULOIDES MUSCULOIDES, Temminck

1853. Esq. Zool. Côte Guiné, p. 161.
Gold Coast.
Synonym: *setulosus*, Peters, 1876, Monatsb. K. Preuss. Akad. Wiss. Berlin, p. 480, pl. 2. Victoria, Cameroons.

100. MUS MUSCULOIDES EMESI, Heller

1911. Smiths. Misc. Coll. LVI, no. 17, p. 5.
Kabula Muliro, Uganda.

101. MUS PAULINA, Thomas

1918. Ann. Mag. Nat. Hist. 9, II, p. 485.
Bitye, Ja River, Cameroons.

102. MUS MAHOMET, Rhoads

1896. Proc. Acad. Nat. Sci. Philadelphia, p. 532.
Sheikh Mahomet, W. Somaliland.

103. MUS PROCONODON PROCONODON, Rhoads

1896. Proc. Acad. Nat. Sci. Philadelphia, p. 531.
Sheikh Husein, W. Somaliland.

104. MUS PROCONODON PASHA, Thomas

1910. Ann. Mag. Nat. Hist. 8, V, p. 89.
Monbuttu, E. Congo.

105. MUS HAUSSA, Thomas & Hinton

1920. Nov. Zool. 27, p. 319.
Kano, N. Nigeria.

106. MUS GERBILLUS, G. M. Allen & Loveridge

1933. Bull. Mus. Comp. Zool. LXXV, 2, p. 112.
Dodoma, Tanganyika.

tenellus Group

107. MUS TENELLUS TENELLUS, Thomas

1903. Proc. Zool. Soc. London, p. 298.
Roseires, Blue Nile, Sudan.

108. MUS TENELLUS SUAHELICUS, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 312.
Taveta, near Mt. Kilimanjaro.

109. MUS TENELLUS ACHOLI, Heller

1911. Smiths. Misc. Coll. LVI, no. 17, p. 6.
Rhino Camp, Lado Enclave.

110. MUS WAMAE, Heller
1911. Smiths. Misc. Coll. LVI, no. 17, p. 5.
Kapiti Plains, Kenya.

111. MUS DESERTI DESERTI, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 90.
Molopo, Bechuanaland.

112. MUS DESERTI VALSCHENSIS, Roberts
1926. Ann. Transv. Mus. XI, p. 251.
Bothaville, Orange Free State.

113. MUS DESERTI PRETORIAE, Roberts
1926. Ann. Transv. Mus. XI, p. 252.
Pretoria, Transvaal.

Not seen and not allocated to Group

114. MUS MATSCHIEI, Wettstein
1916. Anz. Akad. Wiss. Wien, 53, p. 161.
S. Kordofan.

115. MUS BIRUNGENSIS, Lönnberg & Gyldenstolpe
1925. Arkiv. Zool. Bd. 17B, no. 5, p. 5.
Mt. Mikeno, Birunga Volcanoes, Congo.

116. MUS FORMOSANUS, Kuroda
1925. Dobuts Zasshi, 37, no. 435, p. 16.
Formosa.

117. MUS CASTANEUS, Waterhouse
1843. Ann. Mag. Nat. Hist. XII, p. 134.
Philippine Islands.
Synonym: *commissarius*, Mearns, 1905, Proc. U.S. Nat. Mus. XXVIII, p. 449. Davao, Mindanao.

Subgenus *Leggadilla*, Thomas

118. MUS PLATYTHRIX PLATYTHRIX, Bennett
1832. Proc. Zool. Soc. London, p. 121.
Dukhun, India.
Synonym: *spinulosus*, Blyth, 1854, Journ. Asiat. Soc. Bengal, XXIII, p. 734. Punjab.

119. MUS PLATYTHRIX SADHU, Wroughton
1911. Journ. Bombay Nat. Hist. Soc. XX, p. 100.
Virawah, Sind.

120. MUS CINDERELLA, Wroughton
1912. Journ. Bombay Nat. Hist. Soc. XXI, p. 770.
Bhuj, Cutch, W. India.

121. MUS RAMNADENSIS, Bentham
1908. Rec. Indian Mus. II, p. 386.
Ramnad, Madura, Madras, S. India.

122. MUS PHILLIPSI, Wroughton
1912. Journ. Bombay Nat. Hist. Soc. XXI, p. 772.
Nimur district, Central Provinces, India.

123. MUS SURKHA, Wroughton & Ryley

1913. Journ. Bombay Nat. Hist. Soc. XXII, p. 17.
Vijayanagar, Bellary, India.

124. MUS BAHADUR, Wroughton & Ryley

1913. Journ. Bombay Nat. Hist. Soc. XXII, p. 18.
Karwar, Kanara, India.

125. MUS SIVA, Thomas & Ryley

1913. Journ. Bombay Nat. Hist. Soc. XXII, p. 242.
Sivasamundram, S. Mysore, India.

126. MUS GRAHAMI, Ryley

1913. Journ. Bombay Nat. Hist. Soc. XXII, p. 434.
Wotekolli, S. Coorg, India.

127. MUS HANNYNGTONI, Ryley

1913. Journ. Bombay Nat. Hist. Soc. XXII, p. 435.
Makut, S. Coorg, India.

128. MUS FERNANDONI, Phillips

1932. Spolia Zeylan, 16, p. 325.
Central Province, Ceylon.

129. MUS GURKHA, Thomas

1914. Journ. Bombay Nat. Hist. Soc. XXIII, p. 200.
Jerna, Ramnagar, Kumaon, N. India

130. MUS SHORTRIDGEI, Thomas

1914. Journ. Bombay Nat. Hist. Soc. XXIII, p. 30.
Mt. Popa, Burma.

For Key to species of subgenus *Leggadilla* see Wroughton, Indian Mammal Survey, Journ. Bombay Nat. Hist. Soc. XXVI, 1920, p. 955.

Genus 53. MYCTEROMYS, Robinson & Kloss

1916. OROMYS, Robinson & Kloss, Journ. Str. Br. Roy. Asiat. Soc. LXXIII, p. 270. (Not of Leidy.)

1918. MYCTEROMYS, Robinson & Kloss, Journ. Fed. Malay States Mus. VIII, p. 57.

TYPE SPECIES.—*Oromys crociduroides*, Robinson & Kloss.

RANGE.—Sumatra and Java.

NUMBER OF FORMS.—Two.

CHARACTERS.—Skull with little interorbital constriction, long rostrum, and no supraorbital ridges, the general effect not like that of a *Mus*, but rather as in certain sections of the genus *Rattus*, as *verecundus* group. Braincase heavy. Incisive foramina narrow, but not approaching toothrows. Bullae small. Zygomatic plate considerably narrowed, straight anteriorly. Mandible relatively thin and weak, coronoid process much reduced. Lower incisors narrow, much lengthened, the upper ones short.

Cheekteeth of specialized *Mus* type; M. $\frac{3}{3}$ vestigial. M.1 large, with T.1 noticeably distorted inwards.

Ear rather large. Tail longer than head and body. Feet not abnormal, rather narrow. Fur soft.

This genus appears to be a specialized offshoot of the *Mus* series, which actually has few characters of generic value to distinguish it from *Mus*, though the appearance of the skull is very different.

Forms seen: *crociduroides*.

List of Named Forms

1. MYCTEROMYS CROCIDUROIDES CROCIDUROIDES, Robinson & Kloss

1916. Journ. Str. Br. Roy. Asiat. Soc. LXXIII, p. 271.
Korinchi Peak, W. Sumatra.

2. MYCTEROMYS CROCIDUROIDES VULCANI, Robinson & Kloss

1919. Ann. Mag. Nat. Hist. 9, IV, p. 378.
Kadang Badak, Mt. Gedeh, W. Java.

Genus 54. LEGGADINA, Thomas

1910. LEGGADINA, Thomas, Ann. Mag. Nat. Hist. 8, VI, p. 606.

TYPE SPECIES.—*Mus forresti*, Thomas.

RANGE.—Australian: Queensland, South Australia, Northern Territory and Central Australia.

NUMBER OF FORMS.—Nine.

CHARACTERS.—This genus parallels the *Mus* series of genera in essential dental arrangement, so far as enlargement, distortion of M.1 is concerned, and reduction of M.3; but like several other Australian genera which parallel more generalized Old World Murines in dental arrangement, it is much more simplified in teeth characters than *Mus* and its immediate allies. Thus, the cusps are not strong, so far as seen, and the whole of the outer row in the upper molars is becoming vestigial, and fused with their neighbours on the centre row. The genus was originally proposed by Thomas as a subgenus of *Pseudomys*, but as I have remarked elsewhere, it seems to have little to do with that group, and it has subsequently been given generic rank.

Skull small, delicate; supraorbital ridges absent; pterygoids described by Thomas as with "the parapterygoid fossae broad and very shallow, scarcely hollowed at all, the ectopterygoids bordering it externally low, flat, not or scarcely raised above the level of its floor; entopterygoids also much lower and less projecting than is usual"; but this structure does not seem to me to be very different from that found in some species of *Mus*, and even some species of *Rattus*. Bullae variable in size, not extreme.

Molars with a well-marked extra cusp in front of the anterior lamina of M.1 present, as often in Australian genera, and also as in many species of *Mus*; this tooth large, usually slightly more than half the toothrow; the anterointernal cusp very strongly distorted backwards, as in *Mus*; in line with T.4 and T.5. The extra front cusp is largest in *L. forresti*, which species seems to have the most enlarged M.1; all outer cusps in M.1 and M.2 tend to become nearly obliterated, particularly in M.2. M.3 is strongly reduced. Lower molars not abnormal.

Size usually very small; *forresti* appears to go up to 100 mm., but *delicatula*, *patrius* and *hermannsburgensis*, from skins available, appear to be about 50–78 mm. only, and have a proportionately longer hindfoot, perhaps correlated with their smaller size. Tail well haired, in most cases subequal in length to head and body; fur soft; D.5 hindfoot not reduced. Mammae probably 0—2=4.

Forms seen: *delicatula*, *forresti*, *hermannsburgensis*, *messorius*, *patrius*.

List of Named Forms

forresti Group

1. LEGGADINA FORRESTI, Thomas

1906. Abstr. Proc. Zool. Soc. London, 32, p. 6; Proc. Zool. Soc. London, p. 538.
Alexandria, N. Territory, Australia.

delicatula Group

2. LEGGADINA MESSORIUS, Thomas

1925. Ann. Mag. Nat. Hist. 9, XV, p. 670.
Spencer Gulf, S. Australia.

3. LEGGADINA DELICATULA DELICATULA, Gould

1842. Proc. Zool. Soc. London, p. 13.
Port Essington, N. Australia.

4. LEGGADINA DELICATULA MIMULA, Thomas

1926. Ann. Mag. Nat. Hist. 9, XVII, p. 634.
Groote Eylandt, Gulf of Carpentaria, N. Australia.

5. LEGGADINA HERMANNSBURGENSIS HERMANNSBURGENSIS, Waite

1896. Rep. Horn Exp. Centr. Austr. Zool. ii, p. 405.
Hermannsburg, Central Australia.

6. LEGGADINA HERMANNSBURGENSIS BOLAMI, Troughton

1932. Rec. Austr. Mus. XVIII, p. 292.
Ooldea, Trans-Australian Railway, S. Australia.

7. LEGGADINA PATRIUS, Thomas & Dollman

1909. Proc. Zool. Soc. London (1908), p. 791.
Inkerman, Queensland.

8. LEGGADINA FIELDI, Waite. (Not seen)

1896. Rep. Horn. Sci. Exp. Centr. Austr. Zool. ii, p. 403.
Alice Springs, Central Australia.

9. LEGGADINA WAITEI, Troughton. (Not seen)

1932. Rec. Austr. Mus. XVIII, p. 290.
Alice Springs area, Central Australia.

Genus 55. COLOMYS, Thomas & Wroughton

1907. Colomys, Thomas & Wroughton, Ann. Mag. Nat. Hist. 7, XIX, p. 379.

Type Species.—*Colomys goslingi*, Thomas.

RANGE.—African: Cameroons, Congo, Kenya.

NUMBER OF FORMS.—Three.

CHARACTERS.—The hindfoot is longer than is usual in *Rattus* Rats, and is apparently specialized for a life in swamps; "feet much lengthened, especially in metatarsal region; metatarsi apparently somewhat loosely bound together, as though they might splay out from each other in walking on swampy soil" (Thomas). Twenty specimens available average 29 per cent, hindfoot against head and body length, with an extreme of 32 per cent, which overlaps the lowest measurement for the specialized saltatorial genus *Notomys* (Australian).

In addition to this, the skull of the genus is considerably specialized, compared with the majority of Rats of the section.

Braincase broad, round, heavy; frontals considerably constricted. Infraorbital foramen unusually large, and zygomatic plate much narrowed, with its front border nearly straight (it is strongly tilted upwards). Zygoma narrow. No supraorbital ridges. Incisive foramina long, reaching toothrows, and tending to be abnormal, owing to the shape of their dividing septum. Bullae small. Palate broad. Toothrow set rather far forward in skull. Cusps of molars originally rather prominent; the general dental effect suggestive of *Zelotomys*, though less extreme than in that genus. M.3 rather strongly reduced.

Fur very soft. Tail longer than head and body, scaly, rather poorly haired. Forefoot with four rather long digits; hindfoot long, and very narrow; D.5 longer than is usual, though shorter than the central three digits; hallux also longer than is usual. Mammae 2—2=8.

REMARKS.—St. Leger groups this genus with *Malacomys*, on the character of the hindfeet. The metatarsal character, which is used to divide these two genera off from the remainder in the key, is not a character which can be guaranteed in a large assemblage like *Rattus*; but it must be noted that this genus is very much more distinct from normal Rats than is *Malacomys*. The hindfoot is here on average more elongated than *Malacomys*; and the skull and teeth both appear to make the genus quite distinct. However, it may be that with more specimens the measurement percentage given here would become lower.

Forms seen: *bicolor*, *denti*, *goslingi*.

LIST OF NAMED FORMS

1. COLOMYS GOSLINGI GOSLINGI, Thomas & Wroughton

1907. Ann. Mag. Nat. Hist. 7, XIX, p. 380.
Gambi, Uelle River, Belgian Congo.

2. COLOMYS GOSLINGI DENTI, St. Leger

1930. Ann. Mag. Nat. Hist. 10, VI, p. 527.
Elburgon, near Naivasha, Kenya.

3. COLOMYS GOSLINGI BICOLOR, Thomas

1912. Ann. Mag. Nat. Hist. 8, X, p. 682.
Bitye, Ja River, Cameroons.

Genus 56. NESOROMYS, Thomas

1922. NESOROMYS, Thomas, Ann. Mag. Nat. 9, IX, p. 263.

TYPE SPECIES.—*Stenomys ceramicus*, Thomas.

RANGE.—Island of Ceram (west of New Guinea).

NUMBER OF FORMS.—One.

CHARACTERS.—Skull in general like that of the "*Stenomys*" section of *Rattus*, with long rostrum and supraorbital ridges scarcely traceable. Infraorbital foramen enlarged, abnormal, scarcely narrowed below. Bullae moderate. Palate highly abnormal, much broadened, and carried far behind the toothrows, quite different from any *Rattus* seen. Incisive foramina considerably in front of toothrow, narrowed anteriorly, and relatively short. Pterygoid fossae apparently very low.

Dentition of *Rattus* type, not abnormal. Fur thick. Hindfoot narrow, the digits normal. Tail slightly longer than head and body. Head and body 135 mm. (type).

REMARKS.—Rümmler in 1938 has considered this genus a synonym of *Stenomys* (=*Rattus*). But the characters of the infraorbital foramen and more particularly of the palate separate this species very clearly as a well-marked genus from all allies, and indicate a much more specialized stage. It is not well represented in the British Museum, and more material would be welcome. Until intermediate forms are discovered between this genus and *Rattus* in characters of the palate, it must stand as a very distinct genus. The zygomatic plate is much narrowed.

Forms seen: *ceramicus*.

LIST OF NAMED FORMS

1. NESOROMYS CERAMICUS, Thomas
1920. Ann. Mag. Nat. Hist. 9, VI, p. 425.
Mount Manusela, Ceram.

Genus 57. CRUNOMYS, Thomas

1897. CRUNOMYS, Thomas, Abstr. Proc. Zool. Soc. London, June 15; Trans. XIV, p. 393.

TYPE SPECIES.—*Crunomys fallax*, Thomas.

RANGE.—Philippine Islands: Luzon and Mindanao.

NUMBER OF FORMS.—Two.

REMARKS.—This genus, based originally on one skull only with much-worn teeth, was placed in the subfamily Hydromyinae by Thomas. Later he described another species, *melanius*, also based on one skull, with less-worn teeth, the upper series of which are not in the least like typical Hydromyinae. Writing of this species, Thomas states: "The characters of this remarkable species are a great puzzle, and only add to the difficulty of assigning a proper position to the type of the genus, *C. fallax*. The single specimen of the latter is very old, and in the worn-down state of the teeth it was not clear whether they were or were not of Hydromyine structure. The teeth of the present animal are certainly not typically Hydromyine, but rather Murine, while at the same time it is possible that in wearing down they might acquire the slight resemblance to Hydromyine teeth shown by *C. fallax* . . . but until younger specimens of *C. fallax* or older ones of the present form are available for examination, it would be advisable not to express any definite opinions as to the systematic position of either." According to Tate, Rümmler is of the opinion that *Crunomys* should be referred to the Murinae. Although the matter cannot be solved until more specimens come to hand, there is too much doubt on the relationships of the genus to place it in a group of rather extreme genera like the Hydromyinae, and I am provisionally referring it to the Murinae. It seems to me to be a genus which makes the retention of the subfamily Hydromyinae a matter for convenience only.

CHARACTERS.—Skull with extremely broad interorbital region, and no marked constriction apparent in superior aspect. No supraorbital ridges; braincase heavy and large. Zygoma narrow; zygomatic plate very narrow, the anterior border straight, and sharply tilted upwards, the effect like that of normal Hydromyinae, and like the Murine *Macruromys*. Incisive foramina short. Toothrow set far forward in skull. Infraorbital foramen not much narrower below than above, but generally rather narrow throughout. Bullae not large in *melanius*, missing in the type skull. The upper cheekteeth are in the type of *fallax* too worn for definite notes, though perhaps not highly abnormal. In *melanius* they are not far from a specialized (simplified) *Rattus*-type; the outer row is becoming obsolete; cusps merged into each other and not well marked, but traces of eight in M.1, and five in M.2 (the posterior lamina of this tooth reduced). M.3 very small. Lower molars evidently quite normal simple type in *melanius*. Externally with no special peculiarities; small; *fallax* has the fur faintly spiny; tail shorter than head and body, moderately haired; hindfoot narrow, the digits normal.

The incisors are narrow; particularly in the type the lower ones appear relatively long.

Forms seen: *fallax*, *melanius*.

LIST OF NAMED FORMS

1. CRUNOMYS FALLAX, Thomas

1897. Abstr. Proc. Zool. Soc. London, June 15; Trans. Zool. Soc. London, 1898, XIV, p. 394.
Isabella Province, N. Luzon, Philippine Islands.

2. CRUNOMYS MELANIUS, Thomas

1907. Abstr. Proc. Zool. Soc. London, no. 39, p. 5; Proc. Zool. Soc. London, 1907. p. 141.
Mt. Apo, Davao, Mindanao, Philippine Islands.

Genus 58. MACRUROMYS, Stein

1933. MACRUROMYS, Stein, Zeitschr. für Säugetierk. 8, p. 94.

TYPE SPECIES.—*Macruromys elegans*, Stein.

RANGE.—New Guinea.

NUMBER OF FORMS.—Two.

CHARACTERS.—The genus is represented in London by one skull only, type of *major*; these notes are based solely on that species. The chief character is that in this genus the toothrow is abnormally reduced. The braincase is heavy, the rostrum relatively long, with nasals projecting forwards anteriorly. Bullae very small. Incisive foramina well open, broad, but in front of toothrow. Zygomatic plate very narrow, reminiscent in appearance of the Hydromyine type. Infraorbital foramen of moderate size. Cheekteeth evidently not normal in pattern, but too worn in the one skull seen for definite notes; M.3 ring-shaped, very small. A subsidiary cusp traceable in M.1 on inner side between T.1 and T.4. T.4 in M.1 and M.2 seems to be separated from T.5 and 6. Toothrow set far forward in skull. Palate broad, but not extending much behind toothrows. Tail in the one skin seen much longer than head and body (head and body 225 mm., tail 340); it is poorly haired, and with large scales. Hindfoot rather narrow, claws large; ear short. Evidently Tate regards the genus as not far removed from *Rattus*, so I have retained it in the present section. According to this author there are two pairs of inguinal mammae.

The toothrow apparently is about 13·7 per cent or slightly less of condylobasal length.

The genus I am inclined to think is one of the several Indo-Australian types, such as *Crunomys*, that are on the borderline between Murinae and Hydromyinae.

Two species are admitted, differing in size (*elegans* apparently about 150 mm. head and body, *major* as above).

Forms seen: *major*.

LIST OF NAMED FORMS

1. MACRUROMYS ELEGANS, Stein

1933. Zeitschr. für Säugetierk. 8, p. 95.
Weyland Range, Dutch New Guinea.

2. MACRUROMYS MAJOR, Rummler

1935. Zeitschr. für Säugetierk. 10, p. 105.
Buntibasa district, Kratke Mountains, New Guinea.

Genus 59. LOPHUROMYS, Peters

1866. LASIOMYS, Peters, Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 409. (Not of Burmeister.)

1874. LOPHUROMYS, Peters, Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 234.

TYPE SPECIES.—*Lasiomys afer*, Peters.

Range.—African: Abyssinia, Kenya, Uganda, Tanganyika, Gold Coast, Cameroons, Congo, Gaboon.

Number of Forms.—About twenty-one.

Characters.—An aberrant genus, with peculiar cranial and external characters; the teeth tending to vary in detail individually to a larger extent than in any other genus seen.

Skull with almost no interorbital constriction apparent in superior aspect, or this so little marked that the interorbital region appears wider than the rostrum, and is not modified by the constriction. Rostrum varying in length, not extreme. Skull relatively broad and short in appearance; supraorbital ridges rarely or not developed; if ridges are present, they are usually on the parietals, rather than the frontals. Zygomatic plate often extremely narrow, sometimes scarcely tilted upwards, and coming very near the abnormal condition found in *Deomys*. Infraorbital foramen unusually widened, large, and rounded. Zygoma with relatively long jugal. Toothrow set unusually far forwards in skull. Palate relatively broad; bullae variable in size, not extreme. Palatal foramina long, penetrating between toothrows and sometimes very broad. Incisors thin, sometimes slightly pro-odont. The cheekteeth are strongly cuspidate, and very variable in both elements and appearance of pattern. This variation seems to me to be an individual character rather than a specific or racial one. M.1 has all cusps but T.7 (the posterointernal), which is normally suppressed, but in rare cases may appear as a low connecting ridge, as in *Grammomys*. M.2 has all cusps present except T.2 and T.7 (which may appear); T.3 is usually vestigial, and T.1 most often large. M.3 is constantly reduced through the genus, and is bilaminate. M.1 appears four-rooted. All rows of cusps moderately well developed on the upper molars. Sometimes T.1 may be distorted inwards, nearly as in *Mus*. In the type of *ansorgei* this is the case, and a vestigial posterointernal cusp is present, but other specimens of this species have a quite normal dentition. The cusps are extraordinarily raised up in the type of *naso*, and there is a strong extra outer cusp between T.6 and T.9, almost as high as either. Sometimes the upper molars are extremely broadened, but this is not a constant character so far as I have seen through any species. In some forms, as *rubecula* (the type), *zaphiri* (the type), and *flavopunctatus*, the cusps are less raised up than is usual, and T.3 in M.1 is narrowed and quite reduced, though this feature may appear elsewhere in the genus. *L. woosnami* appears to have broader teeth than these, with the cusps more angular and projecting; these types seem to represent the extremes of the genus (other than *naso*), but specimens of *sikapusi* may agree with either, and intermediate forms between both are frequent. Dentitions characteristic of other genera seem covered by specimens in this genus to a bewildering degree. The lower molars appear in the majority of cases not highly abnormal; M.3 is rather reduced.

Fur rather thick and of a peculiar quality. Hindfoot with the three centre digits long, the two outer digits subequal in length and strongly reduced; the foot is rather short. Forefoot with D.5 much shortened. The foreclaws may become rather large. Tail normally much shorter than head and body; but in *woosnami* and *prittiei* it may be slightly longer, or subequal to that measurement: *prittiei* shows more suggested constriction of the interorbital region than other species. The hindfoot is relatively short.

Forms seen: *ansorgei*, *aquilus*, *brevicaudus*, *brunneus*, *flavopunctatus*, *laticeps*, *major*, *manteufeli*, *naso*, *nudicaudus*, *prittiei*, *rita*, *rubecula*, *simensis*, *sikapusi*, *woosnami*, *zaphiri*, *zena*.

Apart from *woosnami* and *prittiei* appearing very distinct from the remainder on length of tail, the genus does not divide satisfactorily into groups, most of the species being distinct from each other on colour, sometimes rather vaguely so. The dentition appears too variable a character on which to base even species in this genus.

List of Named Forms

woosnami Group

1. LOPHUROMYS WOOSNAMI, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 146
E. Ruwenzori, Uganda.

2. LOPHUROMYS PRITTIEI, Thomas

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 377.
Kigezi, S.-W. Uganda.

sikapusi Group

3. LOPHUROMYS AQUILUS AQUILUS, True

1892. Proc. U.S. Nat. Mus. XV, p. 460.
Mt. Kilimanjaro, Tanganyika.
Synonym: *rubecula*, Dollman, 1909, Ann. Mag. Nat. Hist. 8, IV, p. 551.
Elgonyi, Elgon. Status *fide* Hollister.

4. LOPHUROMYS AQUILUS MARGARETTAE, Heller

1912. Smiths. Misc. Coll. LIX, no. 16, p. 7.
Mt. Gargues, Kenya.

5. LOPHUROMYS AQUILUS CHRYSOPUS, Osgood

1936. Field Mus. Nat. Hist. Pub. Zool. ser. XX, p. 242.
Allata, Sidamo, Abyssinia.

6. LOPHUROMYS AQUILUS LATICEPS, Thomas & Wroughton

1907. Ann. Mag. Nat. Hist. 7, XIX, p. 383.
Lake Kivu, Belgian Congo.

7. LOPHUROMYS AQUILUS ZENA, Dollman

1909. Ann. Mag. Nat. Hist. 8, IV, p. 550.
Near Nyeri, Kenya.

8. LOPHUROMYS RITA, Dollman

1910. Ann. Mag. Nat. Hist. 8, V, p. 179.
Lufupa River, Katanga, S. Congo.

9. LOPHUROMYS MAJOR, Thomas & Wroughton

1907. Ann. Mag. Nat. Hist. 7, XIX, p. 382.
Bwanda, Ubanghi River, Belgian Congo.

10. LOPHUROMYS FLAVOPUNCTATUS FLAVOPUNCTATUS, Thomas

1888. Proc. Zool. Soc. London, p. 14.
Probably Ankober, Shoa, Abyssinia.

11. LOPHUROMYS FLAVOPUNCTATUS SIMENSIS, Osgood
1936. Field Mus. Nat. Hist. Pub. Zool. ser. XX, p. 238.
Ras Dashan (Mt. Geech), Simien Mountains, N.-E. Abyssinia.

12. LOPHUROMYS FLAVOPUNCTATUS ZAPHIRI, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 304.
Walamo, east of Upper Omo, S. Abyssinia.

13. LOPHUROMYS FLAVOPUNCTATUS BRUNNEUS, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 305.
Manno, Jimma, S. Abyssinia.
(Status see Osgood, 1936.)

14. LOPHUROMYS BREVICAUDUS, Osgood
1936. Field Mus. Nat. Hist. Pub. Zool. ser. XX, p. 241.
Mt. Albasso, Chilalo Mountains, Arusi, Abyssinia.

15. LOPHUROMYS NUDICAUDUS, Heller
1911. Smiths. Misc. Coll. LVI, no. 17, p. 11.
Efulen, Bulu, Cameroons.

16. LOPHUROMYS NASO, Thomas
1911. Ann. Mag. Nat. Hist. 8, VII, p. 381.
Gaboon.

17. LOPHUROMYS LUTEOGASTER, Hatt
1934. Amer. Mus. Nov. 708, p. 4.
Medje, Ituri, E. Congo.

18. LOPHUROMYS SIKAPUSI SIKAPUSI, Temminck
1853. Esq. Zool. Côte de Guiné, p. 160.
Dabocrom, Gold Coast.
Synonym: (?) *afer*, Peters, 1866, Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 409.
tullbergi, Matschie, Sitz. Ber. Ges. Nat. Fr. Berlin, p. 337, 1911.

19. LOPHUROMYS SIKAPUSI MANTEUFELI, Matschie
1911. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 335.
Mwanza, Victoria Nyanza, Tanganyika.

20. LOPHUROMYS SIKAPUSI ANSORGEI, de Winton
1896. Proc. Zool. Soc. London, p. 607.
Mumias, Kavirondo, Kenya.

21. LOPHUROMYS SIKAPUSI PYRRHUS, Heller
1911. Smiths. Misc. Coll. LVI, 17, p. 10.
Rhino Camp, Lado Enclave.

Genus 60. NOTOMYS, Lesson

1842. NOTOMYS, Lesson, Nouv. Tabl. Regn. Anim. Mamm. p. 129.
1898. THYLACOMYS, Waite, Proc. Roy. Soc. Victoria, new ser. X, pt. 2, p. 121. Preoccupied. (*Hapalotis cervinus*, Gould.)
1898. PODANOMALUS, Waite, Proc. Roy. Soc. Victoria, new ser. X, pt. 2, p. 117. (*Hapalotis longicaudatus*, Gould.)
1900. ASCOPHARYNX, Waite, Ann. Mag. Nat. Hist. 7, V, p. 223. (To replace *Thylacomys*.)

Type Species.—*Dipus mitchelli*, Ogilby.

Range.—Australian: Queensland, New South Wales, South Australia, Western Australia, and Northern Territory.

Number of Forms.—Twelve.

Characters.—Skull of *Pseudomys* type, but without extreme interorbital constriction. Braincase often rather round and heavy. Rostrum relatively long. No supraorbital ridges. Anterior border of zygomatic plate concave, then sharply cut back above. The whole outer side of zygomatic plate strongly ridged and prominent, the upper zygomatic root broadened. Zygoma narrow, rising abruptly anteriorly to considerable height, as in *Leporillus*. Bullae usually relatively very large. Palate tending to be broad, but not extending behind the toothrows. Incisive foramina long and often broad. M.1 three-rooted. Upper cheekteeth normal; T.3 much reduced in M.1; the inner row of cusps well developed, and distorted inwards to a degree; the outer row becoming reduced. M.3 rather small. A vestigial cusp in front of foremost lamina of M.1 may sometimes be traced. In age, the pattern wears down and tends to become laminate. Lower teeth tending to become a series of transverse plates in the adult; originally with no special peculiarity except that the terminal heel of M.1 and M.2 is strongly reduced, and is often absent. M.3 rather small.

External form highly specialized, more or less Dipodide. Tail long, usually moderately to well haired, and tufted terminally. Ears large. Manus relatively small, digits normal. Hindfoot extremely lengthened, and very narrow, evidently fully modified for saltatorial life, the plantar pads reduced to four or three; D.3 the main digit, D.4 and D.2 very slightly shorter; D.5 extremely reduced, though longer than hallux; not reaching base of D.4; hallux very short indeed. Sole naked, so far as seen. This type of saltatorial hindfoot is not known elsewhere in the subfamily. It is nearly as specialized as that of *Dipodomys* (Heteromyidae). The fur is soft.

The genus was formerly split into two genera, *Notomys* and *Ascopharynx*, for those species which possessed a gular pouch, and those which did not. Recently these Rats have been revised by Brazenor, Mem. Nat. Mus. Victoria, VIII, 1934, p. 74, and *Ascopharynx* is suppressed as shown to be based on a form which agrees in this character with the majority of the genus, but *Podanomalus* is reinstated for the forms which differ from *Notomys* "mainly by the absence of a gular glandular area, and the presence, in the male animal only, of an oval slightly swollen presternal gland directly between the forelegs." Thomas was not prepared to admit generic difference on these characters, and it seems that, as Brazenor has not examined four of the species yet, it is premature to do so, apart from the question of these characters being valid for generic purposes, which I very much doubt.

In our material, *longicaudatus* and *sturti* stand apart from the others on account of large size (hindfoot 42 to 45 mm. as against 30–40 of the *mitchelli* group). *N. aistoni*, not seen, agrees with *longicaudatus* in the absence of the gular area; these forms are referred to *Podanomalus* by Brazenor; I provisionally include *sturti* in this group on account of its resemblance to *longicaudatus*, though the character above mentioned is not known in this species. As in many Australian genera, the genus is not well represented in London.

Twenty-eight specimens bearing measurements give an average of hindfoot 34·3 per cent of head and body length, or over a third of this length; in our material, the percentage does not go below 29 per cent.

Forms seen: *alexis*, *aquilo*, *cervinus*, *gouldi*, *longicaudatus*, *macropus*, *macrotis*, *mitchelli*, *mordax*, *richardsoni*, *sturti*.

List of Named Forms

(The *mitchelli* group below represents the restricted *Notomys* of Brazenor. In the *longicaudatus* group, *aistoni* is apparently a much smaller species than the remainder.)

mitchelli Group

1. NOTOMYS MITCHELLI MITCHELLI, Ogilby

1838. Trans. Linn. Soc. London, XVIII, p. 130.
Junction of Murray and Murrumbidgee Rivers, New South Wales.

2. NOTOMYS MITCHELLI MACROPUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 540.
Port Lincoln, S. Australia.

3. NOTOMYS MITCHELLI ALUTACEA, Brazenor

1934. Mem. Nat. Mus. Melbourne, no. 8, p. 79.
Ooldea, S. Australia.

4. NOTOMYS MORDAX, Thomas

1922. Ann. Mag. Nat. Hist. 9, IX, p. 317.
Darling Downs, S. Queensland.

5. NOTOMYS AQUILO, Thomas

1922. Ann. Mag. Nat. Hist. 9, XVIII, p. 540.
Cape York, N. Queensland.

6. NOTOMYS MEGALOTIS, Iredale & Troughton

1934. Memoirs Austr. Mus. VI, p. 84.
Moore's River, W. Australia.
Synonym: *macrotis*, Thomas, 1921, Ann. Mag. Nat. Hist. 9, VIII, p. 538. Name invalid.

7. NOTOMYS RICHARDSONI, Gould

1851. Proc. Zool. Soc. London, p. 127.
S.-W. Australia.
Synonym: *gouldi*, Gould, 1863, Mamm. Austral. iii, Introduction, p. xxxv. W. Australia.

8. NOTOMYS ALEXIS, Thomas

1922. Ann. Mag. Nat. Hist. 9, IX, p. 316.
Alexandria, N. Territory, Australia.
Synonym: *fuscus*, Jones, Rec. S. Austr. Mus. III, p. 3, 1925. Ooldea, S. Australia.

9. NOTOMYS CERVINUS, Gould

1851. Proc. Zool. Soc. London, p. 127.
Interior of S. Australia.

longicaudatus Group

10. NOTOMYS LONGICAUDATUS, Gould

1844. Proc. Zool. Soc. London, p. 104.
Moore's River, W. Australia.

11. NOTOMYS STURTI, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 537.
Interior of New S. Wales, Lower Darling Region.

12. NOTOMYS AISTONI, Brazenor

1934. Mem. Mus. Melbourne, no. 8, p. 84.
Mulka, east of Lake Eyre, S. Australia.

Genus 61. MASTACOMYS, Thomas

1882. Mastacomys, Thomas, Ann. Mag. Nat. Hist. 5, IX, p. 413.

Type Species.—*Mastacomys fuscus*, Thomas.

Range.—Tasmania; also known from South Australia, but from skulls only.

Number of Forms.—Two are named, the South Australian one has not been taken alive.

Characters.—Skull with extreme interorbital constriction, which is continued far backwards, so that the braincase is shortened, as in *Pseudomys*. Anterior zygomatic plate high, concave, and sharply cut back above. Incisors broad, rostrum not long. Supraorbital ridges weak. Incisive foramina long, very narrow, especially posteriorly. Palate excessively narrowed. Bullae relatively small. Toothrows extraordinarily broadened and heavy, more so than in any other Rat examined.

The inner row of cusps of the upper molars point sharply inwards and are raised and enlarged to a degree; the centre row has the cusps much raised and enlarged; the outer row is reduced. M.1 has only six cusps; two on the anterior lamina owing to the complete disappearance of the anteroexternal cusp T.3. The second lamina has three cusps; the third one only. M.2 with a large T.1, a very large T.5 and T.8 (centre row), and a small T.6 and moderate T.4. M.3 with two rows only, as in *Golunda*, but rather less abnormal than in that genus, the centre posterior cusp not vestigial.

Lower teeth with, in those examined, no terminal heel in M.1 and M.2, the teeth extremely broadened; six cusps in M.1, the front pair smallest; four in M.2; three in M.3 owing apparently to the posterior lamina being formed as a transverse plate. The teeth are much heavier and broader than in *Golunda* and *Mylomys*, the only other genera in the group with this extreme type of dentition present. In the lower teeth, the inner row of cusps is larger than the outer row. The British Museum possesses two complete skulls only of this genus, the type and a young one in which the teeth appear to be cutting in an exactly similar pattern to that of the adult.

Fur thick. Hindfoot with the digits of normal proportions. Tail well haired, shorter than head and body. Mammae 4.

Forms seen: *fuscus*, *mordicus*.

List of Named Forms

1. MASTACOMYS FUSCUS, Thomas
1882. Ann. Mag. Nat. Hist. 5, IX, p. 413.
Tasmania.

2. MASTACOMYS MORDICUS, Thomas
1922. Ann. Mag. Nat. Hist. 9, X, p. 551.
Mt. Gambier district, S. Australia. (Extinct ?)

Genus 62. GOLUNDA, Gray

1837. Golunda, Gray, Charlesworth's Mag. Nat. Hist. 1, p. 586.

Type Species.—*Golunda ellioti*, Gray.

Range.—Peninsula of India, north to North-West Frontier, Punjab and Sind. South to Ceylon. East to Bhutan and Nepal.

Number of Forms.—Eleven.

Characters.—Skull of *Arvicanthis* type, with considerable interorbital constriction, much shortened rostrum, strong supraorbital ridges, largish bullae, robust zygoma. Anterior border of zygomatic plate cut back above. Upper incisors broad, one-grooved. Lower incisors plain. Palate relatively narrow, palatal foramina long, tending to be narrow posteriorly.

The molars very broad; upper series with centre row much enlarged, and also the inner row, particularly in M.2 and M.3, much enlarged, the general effect abnormal, the rows of cusps crowded together. In M.1, T.9 is reduced, and T.3 is small; the main cusps are much raised up. In M.2, T.1 is much raised and very large, as is T.4 (the two main inner cusps); the centre row is similar; the outer cusps moderate. M.3 is peculiar; all traces of the outer row have gone, the pattern consisting of four cusps, the two inner ones extremely enlarged and raised up, the posterior centre cusp small, but the anterior one large. M.2 is like M.1, but without T.2; there is a minute T.3 present. Even in old age the pattern is quite clear; a further peculiarity is that in much-worn teeth M.1 actually tends to become the smallest tooth sometimes, a very rare character in the subfamily; it is always relatively small, not much larger than M.2, though the elements of the latter are as usual reduced. Laminae of lower molars 3—2—2, as usual; each lamina with two large prominent cusps except the posterior one on M.3 which has one permanent cusp only. The cusps clearly defined, the terminal heel of M.1 and M.2 strongly reduced.

Form thickset and heavy. Tail rather shorter than head and body, relatively well haired. Hindfoot with the three centre digits long, the two outer digits nearly equal to each other in length, and very short, a character shared with *Mylomys* and *Arvicanthis*. D.5 manus strongly reduced. Mammae 8 (Wroughton). Head and body up to 140 mm. in B.M. material.

Forms seen: *bombax*, *coenosus*, *coffaeus*, *coraginis*, *ellioti*, *gujerati*, *limitaris*, *myothrix*, *newera*, *paupera*, *watsoni*.

List of Named Forms

1. GOLUNDA ELLIOTI ELLIOTI, Gray

1837. Charlesworth's Mag. Nat. Hist. 1, p. 586.
Dharwar, India.
Synonym: *hirsutus*, Elliot, 1839, Madras Journ. X, p. 213.

2. GOLUNDA ELLIOTI LIMITARIS, Thomas

1923. Journ. Bombay Nat. Hist. Soc. XXIX, p. 373.
Kohat, N.-W. Frontier, N. India.

3. GOLUNDA ELLIOTI PAUPERA, Thomas

1923. Journ. Bombay Nat. Hist. Soc. XXIX, p. 374.
Handisera, near Ambala, Punjab.

4. GOLUNDA ELLIOTI WATSONI, Blanford

1876. Proc. Asiat. Soc. Bengal, p. 181.
Kirtar Range, Sind.

5. GOLUNDA ELLIOTI GUJERATI, Thomas

1923. Journ. Bombay Nat. Hist. Soc. XXIX, p. 374.
Palanpur, Gujerat, W. India.

6. GOLUNDA ELLIOTI BOMBAX, Thomas

1923. Journ. Bombay Nat. Hist. Soc. XXIX, p. 375.
Andheri, Salsette Island, Bombay.

7. GOLUNDA ELLIOTI CORAGINIS, Thomas

1923. Journ. Bombay Nat. Hist. Soc. XXIX, p. 375.
Wotekolli, S. Coorg.

8. GOLUNDA ELLIOTI COFFAEUS, Kelaart

1850. Journ. Asiat. Soc. Ceylon, V, p. 327.
Ceylon.

9. GOLUNDA ELLIOTI NEWERA, Kelaart

1850. Journ. Asiat. Soc. Ceylon, V, p. 327.
Newera Eliya, Ceylon.

10. GOLUNDA ELLIOTI MYOTHRIX, Hodgson

1845. Ann. Mag. Nat. Hist. XV, p. 267.
Kahulia Powa, Nepal.

11. GOLUNDA ELLIOTI COENOSA, Thomas

1923. Journ. Bombay Nat. Hist. Soc. XXIX, p. 376.
Hasimara, Bhutan Duars.

Genus 63. ECHIOTHRIX, Gray

1867. Echiothrix, Gray, Proc. Zool. Soc. London, p. 599.
1896. Craurothrix, Thomas, Ann. Mag. Nat. Hist. 6, XVIII, p. 246; new name to replace *Echiothrix* under the impression that it was preoccupied.

Type Species.—*Echiothrix leucura*, Gray.

Range.—Celebes.

Number of Forms.—Three.

CHARACTERS.—Skull extremely abnormal, like that of *Rhynchomys*. Rostrum greatly lengthened, narrow, and tending to take up nearly half length of skull. Interorbital constriction apparent; braincase broad, heavy. Nasals turned up anteriorly at the tip. Occiput not well ridged, but noticeably high. Upper incisors short, but not vestigial as in *Rhynchomys*. Zygomatic plate narrow, and slanting backwards above; infraorbital foramen large, little narrowed below. External pterygoids suppressed as in *Rhynchomys*. Bullae medium. Incisive foramina far forward in front of toothrow, but quite long, and well open. Zygoma narrow. Mandible with coronoid process vestigial, and incisor root forming rather a prominent process. Lower incisors large and highly abnormal, diverging widely from each other; it is difficult to see how they can function, as they close on either side of the premaxillae, more or less, and evidently do not touch the upper incisors at all. On the upper incisors (two skulls seen only) are traces of several faint grooves. Upper molars of normal Murine type, though much worn in those seen; cusps poorly marked (due to age?); the laminae rather broadened, and suggesting the type found in *Zelotomys*. M.3 simple and rather reduced. Lower teeth apparently not abnormal, the third molar quite well developed. Mammae 1—2=6 (Tate). Tail very naked, hairs short, poorly developed, scales large. Fur rough, nearly spiny. Feet evidently narrow.

Thomas transferred this genus to the Rhynchomyinae; but its molars and incisors are not abnormally reduced as they are in *Rhynchomys*, while the cranial characters could have been evolved independently in the two genera owing to similar diet or habits. Tate regards it as an offshoot of the *Rattus xanthurus* group; but this seems one of the few genera in the subfamily with simple teeth that is clearly and definitely not only distinct from *Rattus* but about as far from *Rattus* as it can be. That it may have been derived from *Rattus* appears beside the point; probably every living simple-toothed member of the group was. But that it is very far removed from that genus to-day there can be little doubt.

Forms seen: *leucura*, *brevicula*.

LIST OF NAMED FORMS

1. ECHIOTHRIX LEUCURA LEUCURA, Gray

1867. Proc. Zool. Soc. London, p. 600.
(?) N. Celebes.

2. ECHIOTHRIX LEUCURA CENTROSA, Miller & Hollister

1921. Proc. Biol. Soc. Washington, XXXIV, p. 67.
Winatoe, Middle Celebes.

3. ECHIOTHRIX LEUCURA BREVICULA, Miller & Hollister

1921. Proc. Biol. Soc. Washington, XXXIV, p. 67.
Pinedapa, Gulf of Tomini, Middle Celebes.

Genus 64. ACOMYS, Geoffroy

1838. ACOMYS, Geoffroy, Ann. Sci. Nat. Paris, 2e ser. X, zool. p. 126.

TYPE SPECIES.—*Mus cahirinus*, Geoffroy.

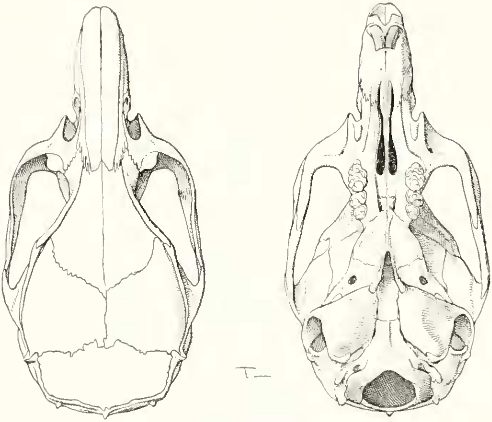

FIG. 14. ACOMYS DIMIDIATUS, Cretzchmar.
B.M. No. 23.5.29.1, ♂; × $2\frac{1}{2}$.

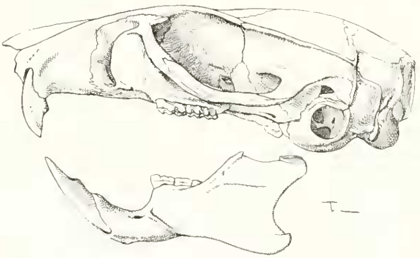

FIG. 15. ACOMYS DIMIDIATUS, Cretzchmar.
B.M. No. 23.5.29.1, ♂; × $2\frac{1}{2}$.

Range.—Africa and Southern Palaearctic. Crete; Cyprus; Palestine, Egypt, Tripoli, Morocco; Sind (North-west India); Arabia. Sahara (Asben), Sudan, Abyssinia, Somaliland, Kenya, Uganda; North Nigeria; Rhodesia, Mozambique, Transvaal and Cape.

Number of Forms.—About thirty-eight.

Characters.—Skull with broad braincase, very large interparietal, strong supraorbital ridges generally, and rostrum moderately long. Zygomatic plate slightly cut back above. Infraorbital foramen well open, scarcely narrowed below. Zygoma rather broad anteriorly, and jugal rather long as a rule. Palatal foramina long, well open, and extending between the toothrows. Size of bullae variable, but never extreme. Mesopterygoid fossa

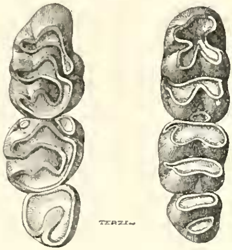

Fig. 16. Acomys dimidiatus minous, Bate.
Cheekteeth; × 10.

roofed in by bone anteriorly—"anterior half of mesopterygoid fossa closed by plate-like outgrowth from the palatines, which meet and form a distinct longitudinal ridge in median line, the open part of fossa thus reduced to a small triangular space bounded chiefly by the hamulars" (Miller). Hamulars joining bullae. Upper cheekteeth: T.1 in M.1 somewhat distorted inwards, as in *Mus*; all cusps present in this tooth except T.7; T.6 tending to project outwards. M.2 with T.1 and T.3, three cusps on second lamina, T.8 and 9 on posterior lamina. M.3 moderate in size, more or less bilaminate, but originally with traces of the front lamina. M.1 three-rooted. Lower teeth evidently with the usual elements, the terminal heel of the first two molars small, and the outer subsidiary cusps vestigial, as a rule. Mandible with very small coronoid; the lower incisor root forms no process on its outer side (compare *Uranomys*). Upper incisors never pro-odont, often opisthodont.

In the few skulls seen of *A. subspinosus*, the teeth are abnormally narrowed (for the genus), and M.3 is strongly reduced.

Fur always densely spiny. Ear may be large. Tail relatively well clothed with bristle-like hairs. Hindfoot broad; the digits not reduced; the foot proportionately strongly shortened. Mammae 4—inguinal (Shortridge, South-west African species).

Forms seen: *ablutus*, *aegyptiacus*, *airensis*, *albigena*, *argillaceus*, *brockmani*, *cahirinus*, *dimidiatus*, *enid*, *flavidus*, *homericus*, *hunteri*, *ignitus*, *johannis*, *kempi*, *louisae*, *minous*, *mullah*, *nesiotes*, *nubilus*, *percevali*, *pulchellus*, *sabryi*, *selousi*, *subspinosus*, *umbratus*, *viator*, *wilsoni*, *witherbyi*.

This genus, like many desert-dwelling genera of Southern Palaearctic and African Muridae, is not in a clear state of revision, and it seems there are far too many forms standing as distinct species.

subspinosus group. *A. subspinosus*, from South Africa, is absolutely distinct from all other species examined on the dental details already noted.

cahirinus group. This contains the rest of the genus, and in the material seen, the following sections seem to be recognizable:

A. *russatus* section: containing the Golden Spinymice from Sinai and Egypt. This species (*russatus*) differs from all others in its black hands and feet. The spines are powerfully developed.

B. *wilsoni* section: containing *wilsoni* and races only, from Kenya, Sudan, Uganda. Small densely spiny species with short tail and proportionately very short hindfoot. Head and body 83 mm. or less.

C. *cahirinus* section: all other forms. There is surprising lack of distinction between many of the "species." *A. dimidiatus* is according to Flower & Aharoni a subspecies of *cahirinus*; but, as has been pointed out by Morrison-Scott, in the B.M. material *cahirinus* is quite distinct. It is darker than the remainder, except *percevali* from Kenya, which appears to be its East African representative, and differs in its paler belly.

Of the remainder, *brockmani* is paler than most; the spiny covering appears weaker in *selousi*, *mullah* and *louisae* than in the majority, but this may be an age character, or a variable character. Many of these forms may be ultimately regarded as races of *dimidiatus*, together with *ignitus*, *viator*, *johannis*, etc. Members of this section are typically though not always larger than *wilsoni*: up to about 119 mm. at extreme development.

List of Named Forms

cahirinus Group

(*russatus* Section)

1. ACOMYS RUSSATUS RUSSATUS, Wagner

1839. Abh. Akad. Munich, III, p. 195, pl. 3, fig. 2.
Sinai.

2. ACOMYS RUSSATUS AEGYPTIACUS, Bonhote

1912. Proc. Zool. Soc. London, p. 230.
Wadi Hof, near Helwan, Egypt.
Synonym: *affinis*, Gray, List. Spec. Mamm. Brit. Mus. 108, 1843.

(Typical Section)

3. ACOMYS PERCEVALI, Dollman
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 126.
Chanler Falls, N. Guaso Nyiro, Kenya.

4. ACOMYS CAHIRINUS, Desmarest
1819. Nouv. Dict. Hist. Nat. XXIX, p. 70.
Cairo, Egypt.
Synonym: (*cahirinus*, Geoffroy, 1812, Descr. Egypt, II, pl. 5, nom. nud.)
sabryi, Kershaw, 1922, Ann. Mag. Nat. Hist. 9, X, p. 107.
Helwan, Egypt.

5. ACOMYS CINERACEUS, Fitzinger & Heuglin
1867. Sitz. K. Akad. Wiss. Wien. Math. Nat. Cl. 54, pt. 1, p. 573.
Doka, E. Senaar, Sudan.
Synonym: *witherbyi*, de Winton, 1901, Nov. Zool. VIII, p. 400. El Kawa, south of Khartoum. Status *fide* G. M. Allen.
cinerascens, Heuglin, 1877, Reise N. Ost. Afr. II, p. 70.

6. ACOMYS DIMIDIATUS DIMIDIATUS, Cretzchmar
1826. Rüppell, Atlas, p. 37, Taf. 13, fig. a.
Sinai.
Synonym: *hispidus*, Brants, 1827, Muizen, p. 154.
megalotis, Lichtenstein, 1829, Darstell. pl. 37, fig. 2.

7. ACOMYS DIMIDIATUS HOMERICUS, Thomas
1923. Ann. Mag. Nat. Hist. 9, XII, p. 173.
El Khaur, Aden district, S. Arabia.

8. ACOMYS DIMIDIATUS FLAVIDUS, Thomas
1917. Journ. Bombay Nat. Hist. Soc. XXV, p. 205.
Laki Hills, Sehwan, Sind, N.-W. India.

9. ACOMYS DIMIDIATUS NESIOTES, Bate
1903. Ann. Mag. Nat. Hist. 7, XI, p. 565.
Kernyia Hills, near village of Dikomo, Cyprus.

10. ACOMYS DIMIDIATUS MINOUS, Bate
1905. Proc. Zool. Soc. London, p. 321.
Kanea, Crete.

11. ACOMYS HUNTERI, de Winton
1901. Nov. Zool. VIII, p. 401.
Tokan, near Suakin, Red Sea Province, Sudan.

12. ACOMYS AIRENSIS, Thomas & Hinton
1921. Nov. Zool. XXVIII, p. 8.
Mt. Baguezan, Asben, W. Sahara.

13. ACOMYS VIATOR, Thomas
1902. Proc. Zool. Soc. London, p. 10.
Wadi Sultan, near Sokna, Tripoli.

14. ACOMYS JOHANNIS, Thomas
1912. Ann. Mag. Nat. Hist. 8, IX, p. 272.
Kabwir, Bauchi Plateau, N. Nigeria.

15. ACOMYS IGNITUS IGNITUS, Dollman

1910. Ann. Mag. Nat. Hist. 8, VI, p. 229.
Voi, Kenya.
Synonym: *pulchellus*, Dollman, 1911, Ann. Mag. Nat. Hist. 8, VIII, p. 127. Chanler Falls, Kenya.

16. ACOMYS IGNITUS MONTANUS, Heller

1914. Smiths. Misc. Coll. LXIII, no. 7, p. 12.
Mt. Marsabit, N. Kenya.

17. ACOMYS IGNITUS KEMPI, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 125.
Chanler Falls, N. Guaso Nyiro, Kenya.

18. ACOMYS MULLAH, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIV, p. 103.
Harar, Abyssinia.

19. ACOMYS BROCKMANI, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 259.
Bulhar, Somaliland.

20. ACOMYS SELOUSI, de Winton

1896. Proc. Zool. Soc. London, p. 807.
Near Bulawayo, Rhodesia.

21. ACOMYS LOUISAE LOUISAE, Thomas

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 269.
Henwaina Plain, 40 miles south of Berbera, British Somaliland.

22. ACOMYS LOUISAE UMBRATUS, Thomas

1923. Ann. Mag. Nat. Hist. 9, XI, p. 174.
Wagar Mountain, Gobis Mountains, 40 miles south-east of Berbera, British Somaliland.

(*wilsoni* Section)

23. ACOMYS WILSONI WILSONI, Thomas

1892. Ann. Mag. Nat. Hist. 6, X, p. 22.
Mombasa, Kenya.

24. ACOMYS WILSONI ARGILLACEUS, Hinton & Kershaw

1920. Ann. Mag. Nat. Hist. 9, VI, p. 101.
Mongalla, Sudan.

25. ACOMYS WILSONI ENID, St. Leger

1932. Ann. Mag. Nat. Hist. 10, IX, p. 241.
Koliokwell River, west of Lake Rudolf, Uganda.

26. ACOMYS WILSONI NUBILUS, Dollman

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 486.
Magadi, Kenya.

27. ACOMYS WILSONI ABLUTUS, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 127.
Nyama Nyango, N. Guaso Nyiro, Kenya.

subspinosus Group

28. ACOMYS SUBSPINOSUS, Waterhouse
1837. Proc. Zool. Soc. London, p. 104.
Cape, S. Africa.

Not allocated to Group

(I have not examined those listed below, and am unable to allocate them to group or section.)

29. ACOMYS CHUDEAUI, Kollman
1911. Bull. Mus. Paris, p. 402.
Atar, south-west of Biskra, Mauretania.

30. ACOMYS HAWASHENSIS, Frick
1914. Ann. Carnegie Mus. 9, p. 26.
Sadi Malka, Hawash, Abyssinia.

31. ACOMYS SEURATI, Heim de Balsac
1936. Suppl. au Biol. de France et de Belgique, Paris, 21, 356, f. 6, no. 4.
Iniker, Ahaggar, S. Algeria.

32. ACOMYS INTERMEDIUS, Wettstein
1916. Anz. Akad. Wiss. Wien, 53, p. 161.
Dilling, S. Kordofan, Sudan.

33. ACOMYS NUBICUS, Heuglin
1877. Reise N. Ost. Afr. II, p. 70.
"Nubia along the Nile."

34. ACOMYS ALBIGENA, Heuglin
1877. Reise N. Ost. Afr. II, p. 69.
Bogos, Eritrea.

35. ACOMYS BOVONEI, de Beaux
1934. Atti. Soc. Ital. Sci. Nat. LXXIII, p. 280.
El Bur, Italian Somaliland.

36. ACOMYS HYSTRELLA, Heller
1911. Smiths. Misc. Coll. LVI, 17, p. 13.
Nimule, N. Uganda.

37. ACOMYS SPINOSISSIMUS, Peters
1852. Reise nach Mossambique: Säugeth. p. 160.
Tette and Buio, Portuguese E. Africa.

38. ACOMYS TRANSVAALENSIS, Roberts
1926. Ann. Transv. Mus. XI, p. 252.
Newgate, Zoutspansberg, Transvaal.

Genus 65. URANOMYS, Dollman

1909. URANOMYS, Dollman, Ann. Mag. Nat. Hist. 8, IV, p. 551.

TYPE SPECIES.—*Uranomys ruddi*, Dollman.

RANGE.—African: Uganda, Gambia, Nigeria, Gold Coast, Nyasaland.

NUMBER OF FORMS.—Seven.

Characters.—Skull with relatively short rostrum, broad braincase, interorbital constriction apparent, though little marked, supraorbital ridges usually developed. Jugal relatively long. Anterior border of zygomatic plate cut back above. Incisive foramina long, extending nearly to M.2, and rather broad. Bullae medium. Palate broad, the posterior portion continued backwards, and the mesopterygoid fossae roofed in by bone, as in *Acomys*. Upper incisors usually strongly pro-odont, but this character not well marked in *acomyoides*. Lower incisors long, the roots showing rather prominently on the mandible; though not so extreme as in *Bandicota*, this is the nearest approach to that genus in this formation that I have seen other than in perhaps *Anisomys* and *Echiothrix*. Cheekteeth with M.3 reduced; the cusps evidently not abnormal, but not very well marked (most of the small series seen are nearly worn out).

Hindfoot broad, the three central digits rather long, D.5 and the hallux short. Fur stiff, like that of *Lophuromys*. Tail short, moderately or well haired. On the type label of *woodi* is noted, mammae 3—3.

This genus has been considered a near ally of *Acomys* by more than one author.

Forms seen: *acomyoides*, *foxi*, *oweni*, *ruddi*, *tenebrosus*, *woodi*.

It is not a well-known genus, and at the present, with limited material, no comments are offered on the distinctness or otherwise of the species.

List of Named Forms

1. URANOMYS RUDDI, Dollman

1909. Ann. Mag. Nat. Hist. 8, IV, p. 552.
Kirui, Mt. Elgon, Uganda.

2. URANOMYS UGANDAE, Heller

1911. Smiths. Misc. Coll. LVI, 17, p. 12.
Kikonda, Uganda.

3. URANOMYS TENEBROSUS, Hinton

1921. Ann. Mag. Nat. Hist. 9, VII, p. 370.
Nsana, N.-W. Nyasaland.

4. URANOMYS WOODI, Hinton

1921. Ann. Mag. Nat. Hist. 9, VII, p. 369.
Cholo, S. Nyasaland.

5. URANOMYS OWENI, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 431.
Marakissa, Gambia.

6. URANOMYS FOXI, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 273.
Panyam, N. Nigeria.

7. URANOMYS ACOMYOIDES, Ingoldby

1929. Ann. Mag. Nat. Hist. 10, III, p. 523.
Kintampo, N. Ashanti, Gold Coast.

The remaining genera appear very distinct from the main stem of the Murinae.

Genus 66. BANDICOTA, Gray.

1873. BANDICOTA, Gray, Ann. Mag. Nat. Hist. 4, XII, p. 418.
1907. GUNOMYS, Thomas, Ann. Mag. Nat. Hist. 7, XX, p. 203. (*Arvicola bengalensis*, Gray & Hardwicke.)

TYPE SPECIES.—*Bandicota gigantea*, Gray.

RANGE.—Indo-Malayan: Peninsular India generally, Sind, north to Kashmir; Bengal, Nepal, Burma, Annam, Siam, Yunnan, to Malacca; Sumatra, Java. Formosa.

NUMBER OF FORMS.—About twenty-one.

CHARACTERS.—Like *Nesokia* (next to be described), but less extremely specialized. Lower incisor root forming prominent process on mandible, but usually in rather lower position than in *Nesokia*, and rather less extreme. Skull similar in most respects to *Nesokia*; rather narrower often in the larger species. Occiput powerful; zygomatic plate as in *Nesokia*; palatal foramina not specially shortened, often reaching toothrows, though narrowed. Incisors rather less broad as a rule than in *Nesokia*, and sometimes pro-odont. Coronoid process high. Bullae relatively large. Palate little narrowed. Cheek-teeth becoming a series of transverse plates (more or less straight), as in *Nesokia*, but rather less extreme than in that genus, and often with traces of cusps, probably always at birth. The cusps are crowded together. A minute postero-internal cusp is present in the young, in M.1 and M.2. M.2 has T.1 present, and the usual second and third lamina. M.3 is smaller than M.2, but not much reduced. M.1 may be five- or six-rooted. The pattern is like that of *Nesokia* in the adult, except that in M.2 and M.3 T.1 is apparently very generally traceable. Essential external characters as in *Nesokia*, though size may become large, up to 329 head and body or perhaps more. Plantar pads 6. Tail usually less short than in *Nesokia*, and may approach head and body length. In the lower teeth, there seems a tendency towards suppression of the terminal heel (least marked in the larger forms). The mammae vary from 3—3 = 12 to a condition like the African *coucha* Rats in which there are about 18, and they are not separated into sets.

This genus was divided by Thomas into two, *Bandicota* and "*Gunomys*." The latter was simply characterized as:

> "Skull broad. Palatal foramina long. Mammae irregular, 14–18," against the "skull narrow and long" of *Bandicota*.

Wroughton keys the two groups in the Indian Mammal Survey as:

> "Head and body more than 250. Mammae 3—3 = 12. BANDICOTA.
> Head and body at most 225. Mammae 16–18. GUNOMYS."

But "*Gunomys*" *gracilis* of Wroughton has mammae as in *Bandicota*, 3—3 = 12; whereas *Bandicota savilei* of Wroughton (included as a *Bandicota* in his key) has the head and body about 223. Kloss in 1921 compared *Bandicota* with "*Gunomys*" and gave the following table:

	Bandicota	Gunomys
Skull	A little narrowed, breadth to length index 53–56.	This index 55–60.
Mammae . . .	12	12–18
Tail averages proportionately	A little longer, more than ·8 of head and body length.	Less than ·8 of head and body length.
Palatal foramina . .	Less contracted posteriorly.	More so.

He remarked that the differences were hardly of generic rank. It seems quite clear that *Gunomys* must be treated as a synonym of *Bandicota*, which is in itself not very widely separable from *Nesokia*.

The species of *Bandicota* were reviewed by Wroughton, Journ. Bombay Nat. Hist. Soc. XVIII, p. 736, 1908.

They appear to me to divide into five groups:

bengalensis group. Multimammate. Smallish forms (head and body at most 225 (Wroughton)). I very much doubt whether there is more than one valid species in this group. The differences given by Wroughton seem racial rather than specific. Perhaps *lordi*, rather a large type, may be a species, but there seem to be intermediate forms, such as *varius*, nearly as large. I therefore provisionally treat all named forms as subspecies of *bengalensis*, assuming that all have the multimammate character present.

gracilis group. Like the last, but mammae separated into sets: 3—3 = 12.

indica group. As a rule rather larger (hindfoot 52 or less); mammae as far as known 3—3 = 12; including a few rather doubtfully distinguishable species, as *nemorivaga*; and one evidently clearly distinct one, *savilei*, which is smaller as a rule than this section of the genus (hindfoot 27–43 mm., head and body about 223 or more). Apart from this species, members of this group are typically 240–300 mm. head and body.

gigantea group. Like the last, but giant: hindfoot 59, 60 or more. Head and body to 360 mm. or more. The status of *B. malabarica* is at the moment not clear.

This arrangement must be treated as provisional. The nomenclature of Wroughton is accepted; but according to Tate the name *bandicota* should stand for the giant forms, with synonym *gigantea*; Wroughton states that *bandicota* is a synonym of *indica*.

Forms seen: *bandicota*, *bengalensis*, *curtata*, "*dubius*," *elliotana*, *gracilis*, *insularis*, *indica*, *jabouillei*, *kok*, *lordi*, *malabarica*, *mordax*, *nemorivaga*, *savilei*, *setifera*, *sindicus*, "*tarayensis*," *varillus*, *varius*, *wardi*.

List of Named Forms

bengalensis Group

1. BANDICOTA BENGALENSIS BENGALENSIS, Gray & Hardwicke

1833. Ill. Ind. Zool. pl. 21.

Bengal.

Synonym: *daccaensis*, Tytler, 1854, Ann. Mag. Nat. Hist. 2, XIV, p. 173.

(Bandicota bengalensis bengalensis), *tarayensis*, Horsfield, 1855, Ann. Mag. Nat. Hist. 2, XVI, p. 112.
plurimammis, Horsfield, 1855, Ann. Mag. Nat. Hist. 2, XVI, p. 112.
morungensis, Horsfield, 1855, Ann. Mag. Nat. Hist. 2, XVI, p. 112.
barclayanus, Anderson, 1878, Journ. Asiat. Soc. Bengal, XLVII, Part ii, p. 229.
blythianus, Anderson, 1878, Journ. Asiat. Soc. Bengal, XLVII, Part ii, p. 227.

2. BANDICOTA BENGALENSIS SUNDAVENSIS, Kloss
1921. Treubia, II, 1, p. 116.
Oleleh, Atje, Sumatra.

3. BANDICOTA BENGALENSIS VARILLUS, Thomas
1907. Ann. Mag. Nat. Hist. 7, XX, p. 205.
Georgetown, Penang, Malay Peninsula.

4. BANDICOTA BENGALENSIS KOK, Gray
1837. Charlesworth's Mag. Nat. Hist. 1, p. 585.
Dharwar, S. Mahratta Country, India.
Synonym: *providens*, Elliot, 1839, Madras Journ. X, p. 209.

5. BANDICOTA BENGALENSIS INSULARIS, Phillips
1936. Spolia Zeylanica, 20, p. 95.
Thinney, near Jaffna, in N. Province of Ceylon.

6. BANDICOTA BENGALENSIS WARDI, Wroughton
1908. Journ. Bombay Nat. Hist. Soc. XVIII, p. 745.
Pandritton, Kashmir.

7. BANDICOTA BENGALENSIS SINDICUS, Wroughton
1908. Journ. Bombay Nat. Hist. Soc. XVIII, p. 746.
Pithoro, Central Sind district.

8. BANDICOTA BENGALENSIS VARIUS, Thomas
1907. Ann. Mag. Nat. Hist. 7, XX, p. 204.
Georgetown, Pinang, Malay Peninsula.

9. BANDICOTA BENGALENSIS LORDI, Wroughton
1908. Journ. Bombay Nat. Hist. Soc. XVIII, p. 746.
Kolaba district, Konkan, Bombay.

gracilis Group

10. BANDICOTA GRACILIS, Nehring
1902. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 116.
Ceylon.
Synonym: *dubius*, Kelaart, 1850, Journ. Asiat. Soc. Ceylon, II, pt. 2, p. 319. Name preoccupied.

indica Group

11. BANDICOTA SAVILEI SAVILEI, Thomas
1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 641.
Mt. Popa, Burma.

12. BANDICOTA SAVILEI CURTATA, Thomas

1929. Ann. Mag. Nat. Hist. 10, III, p. 205.
Raheng, W. Siam.

13. BANDICOTA INDICA INDICA, Bechstein

1800. Ueber Vierfüss. Thiere, II, p. 713.
Pondicherry, India.
Synonym: *perchal*, Shaw, 1801, Gen. Zool. II, p. 55.
(?) *bandicota*, Bechstein, 1800, Ueber Vierfüss. Thiere, II, p. 714.

14. BANDICOTA INDICA SETIFERA, Horsfield

1824. Zool. Res. Java, no. 8, pl. XXIV.
Java. (Occurs also in Sumatra.)

15. BANDICOTA INDICA ELLIOTANA, Anderson

1878. Journ. Asiat. Soc. Bengal, XLVI, p. 231.
Calcutta.

16. BANDICOTA NEMORIVAGA NEMORIVAGA, Hodgson

1836. Journ. Asiat. Soc. Bengal, V, p. 234.
Nepal. (Occurs in Yunnan and Formosa, according to Wroughton.)
Synonym: *macropus*, Hodgson, 1845, Ann. Mag. Nat. Hist. XV, p. 268.

17. BANDICOTA NEMORIVAGA MORDAX, Thomas

1916. Journ. Bombay Nat. Hist. Soc. XXIV, p. 642.
Chieng-Mai, N. Siam.

18. BANDICOTA SIAMENSIS, Kloss

1919. Journ. Nat. Hist. Soc. Siam, III, p. 382.
Tachin, Central Siam.

gigantea Group

19. BANDICOTA GIGANTEA GIGANTEA, Hardwicke

1804. Trans. Linn. Soc. London, VII, p. 306.
Coast of Malabar.
(According to Tate, 1936, p. 611, this species should be known as *bandicota*, Bechstein; a synonym of *indica*, according to Wroughton.)

20. BANDICOTA GIGANTEA JABOUILLEI, Thomas

1927. Proc. Zool. Soc. London, p. 54.
Tourane, Annam.

21. BANDICOTA MALABARICA, Shaw

1801. Gen. Zool. II, p. 54.
Malabar, S. India.

Genus 67. NESOKIA, Gray

1842. NESOKIA, Gray, Ann. Mag. Nat. Hist. X, p. 264.
1860. SPALACOMYS, Peters, Abhandl. K. Akad. Wiss. Berlin, p. 139. (*Spalacomys indicus*, Peters.)

TYPE SPECIES.—*Arvicola indica*, Gray & Hardwicke.

RANGE.—Chiefly South-western Asiatic part of Palaearctic: North India (Delhi, Sind, Baluchistan, North-west Frontier), Persia, Southern Russian Turkestan (Turkmenia); eastwards to Lob Nor (Sinkiang); also from Afghanistan, Mesopotamia, Syria, Palestine, and Northern Egypt.

Number of Forms.—About thirteen.

Characters.—Skull modified to a certain extent for fossorial life; short, broad, with considerable interorbital constriction, well-marked supraorbital ridges which extend back to occipital region, this region strong, prominent. Rostrum short; incisors extremely broad, and rather pro-odont. Zygomatic width considerable. Zygomatic plate cut back above, broad, the infraorbital foramen moderate above, much narrowed below. Anterior portion of zygoma broadened, jugal short. Incisive foramina slit-like, much shortened, the incisor root sometimes forming a knob behind them. Bullae large and well inflated. Palate relatively narrow; pterygoid fossae deep. Mandible with high coronoid process, rather thick lower border, and lower incisor root forming a very powerful knob beside the condylar process, and nearly as high as this process, the structure comparable to that of *Rhizomys*.

Upper molars broad, hypsodont, plain laminate; no traces of cusps, or scarcely so, in any examined, though I have not seen any cutting specimens. Laminae 3—2—2, the posterior lamina of M.3 smaller than the others as a rule. M.1 evidently five-rooted. It may be noted that the remnants of the front lamina of M.2 (T.1, etc.) seem in this genus to be entirely suppressed. Lower molars a series of transverse plates.

Fur harsh or occasionally relatively soft. Tail considerably shorter than head and body, usually poorly haired (rather more naked than in *Bandicota* as a rule). Hindfoot with D.5 and the hallux not specially reduced. The claws may be rather large. Mammae 2—2 = 8.

Size moderate: about 150–250 head and body.

The forms referred to the genus were revised by Wroughton, Journ. Bombay Nat. Hist. Soc. XVII, 1908, p. 736. All were regarded as distinct species; but all appear to be no more than races of the type. Vinogradov treats all forms occurring in U.S.S.R. as subspecies, including *huttoni* which seems one of the most clearly distinct.

Forms seen: *bacheri*, *bailwardi*, *beaba*, *brachyura*, *buxtoni*, *griffithi*, *hardwickei*, *huttoni*, *indica*, *satunini*, *suilla*.

List of Named Forms

1. NESOKIA INDICA INDICA, Gray & Hardwicke

1832. Ill. Ind. Zool. 1, pl. xi.
India.
Synonym: *hardwickei*, Gray, 1837, Charlesworth's Mag. Nat. Hist. 1, p. 585.

2. NESOKIA INDICA BEABA, Wroughton

1908. Journ. Bombay Nat. Hist. Soc. XVIII, p. 741.
Pithoro, Central Sind Desert.

3. NESOKIA INDICA GRIFFITHI, Horsfield

1851. Cat. Mamm. Ind. Mus. p. 145.
Pushut, N.-W. Frontier, N. India.

4. NESOKIA INDICA HUTTONI, Blyth

1846. Journ. Asiat. Soc. Bengal, XV, p. 139.
Kandahar, Afghanistan.

5. NESOKIA INDICA SATUNINI, Nehring

1899. Sitz. Ber. Ges. Nat. Fr. Berlin, vii, p. 108.
Merv, Transcaspia.
Synonym: (?) *boettgeri*, Radde & Walter, 1889, Zool. Jahrb. iv, p. 1036. See Wroughton for status. According to Thomas, 1907, not distinguishable from *huttoni*. Amu-Darya, Transcaspia.

6. NESOKIA INDICA BAILWARDI, Thomas

1907. Ann. Mag. Nat. Hist. 7, XX, p. 199.
Bunder-i-gaz, south shore of Caspian Sea.

7. NESOKIA INDICA SCULLYI, Wood & Mason

1876. Proc. Asiat. Soc. Bengal, p. 80.
Yarkand, Chinese Turkestan.

8. NESOKIA INDICA DUKELSKIANA, Heptner

1928. Arch. Naturg. 92A, Heft 7, p. 126.
Samarkand, Russian Turkestan.

9. NESOKIA INDICA BRACHYURA, Buchner

1889. Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 82.
Lob Nor, Sinkiang.

10. NESOKIA INDICA BUXTONI, Thomas

1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 422.
Amara, Mesopotamia.

11. NESOKIA INDICA MYOSURA, Wagner

1845. Arch. f. Naturg. XI, Heft 1, p. 149.
Syria.

12. NESOKIA INDICA BACHERI, Nehring

1897. Zool. Anz. no. 547, p. 503.
Ghor el Safieh, Palestine.

13. NESOKIA INDICA SUILLA, Thomas

1907. Ann. Mag. Nat. Hist. 7, XX, p. 203.
Suez, Egypt.

The "*Nesokia*" *argyropus* of Cabrera, Bol. Real Soc. Esp. Hist. Nat. 1, p. 118, 1901, Persia, Bashtyari Mountains, is an *Arvicola* (Microtinae) (Cabrera, 1912).

Genus 68. BEAMYS, Thomas

1909. BEAMYS, Thomas, Ann. Mag. Nat. Hist. 8, IV, p. 107.

TYPE SPECIES.—*Beamys hindei*, Thomas.

RANGE.—East Africa: known from Kenya and Nyasaland.

NUMBER OF FORMS.—Two.

REMARKS.—This genus has been referred to the Dendromyinae, but I am convinced it has nothing to do with them. It has, it is true, the anterointernal cusp of M.1 suppressed; but all other cusps, including the posterointernal, are strongly developed, whereas in Dendromyinae the whole inner row is vestigial and there is no posterointernal; and in this genus M.3 is large, bilaminate, and well developed, whereas in all Dendromyinae it is vestigial. The infraorbital foramen is normal in this genus, highly abnormal as a general rule in Dendromyinae. Well-developed cheekpouches are present; it is probably on this account that T.1 in M.1 has become suppressed; very much the same thing is happening in *Cricetomys* and *Saccostomus*, in which genera cheekpouches are also present. I think that neither of these three genera are specially allied to each other, but that all are evolving or have evolved a roughly similar dental arrangement as regards the forepart of M.1 independently. *Beamys* is much the least specialized of the three, but is nevertheless an isolated type.

Characters.—Cusps of the molars prominent, and angular. M.2 with six cusps, the foremost lamina almost entirely obliterated; M.1, as indicated above, with only T.2 and T.3 on the front lamina, and with T.4, 5, 6, and T.7, 8, and 9 all well developed. M.3 large, with two roughly equal transverse plates. A small T.3 is present in M.2, but evidently no T.1. In the only unworn skull seen, T.7 is joined to T.9 by a ridge passing behind T.8; M.2 is similar in this feature. Lower teeth normal, the outer subsidiary cusps strong, the terminal heel of M.1 and M.2 well developed. Skull with poorly marked supraorbital ridges, and rather long rostrum. Incisive foramina very short, far in front of toothrows. Zygomatic plate more or less straight anteriorly; infraorbital foramen moderately large; jugal relatively long; bullae moderately small; palate broad.

Fur soft. Tail very poorly haired, in the very few seen reminiscent of the naked-tailed *Melomys-Uromys* type of New Guinea Rats; hindfoot broad, arboreal, D.5 relatively long, the three central digits rather short, hallux moderate. Cheekpouches present.

Forms seen: *hindei*, *major*.

The two known species differ from each other in size (*major*, hindfoot 25 mm.; *hindei*, 20·7).

List of Named Forms

1. BEAMYS HINDEI, Thomas

1909. Ann. Mag. Nat. Hist. 8, IV, p. 108.
Taveta, coast region, British E. Africa.

2. BEAMYS MAJOR, Dollman

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 428.
Mlanje, Nyasaland, E. Africa.

Genus 69. SACCOSTOMUS, Peters

1846. Saccostomus, Peters, Bericht. und Verhandl. K. Preuss. Akad. Wiss. Berlin, p. 258.

1903. Eosaccomys, Palmer, Science, N. S. XVII, 439, p. 873. Proposed to replace *Saccostomus* on the assumption that it was preoccupied by *Saccostoma*, Fitzinger. Thomas & Schwann, Proc. Zool. Soc., p. 269, 1905, do not consider this the case; and the name *Saccostomus* is retained by Hollister, 1919, St. Leger, 1931, and by most authors.

Type Species.—*Saccostomus campestris*, Peters.

Range.—African: Kenya, Uganda, Rhodesia, Nyasaland, Mozambique, South-west Africa, Bechuanaland, Transvaal, Angola, to Cape Province.

Number of Forms.—Thirteen are named.

Characters.—Skull relatively narrow, with considerable interorbital constriction; rostrum not shortened. Supraorbital ridges often absent, or may be weakly developed. Zygomatic plate slightly cut back above; infraorbital foramen not much wider above than below, but not abnormally large; jugal relatively long. Incisive foramina long, well open, usually reachng the toothrow. Palate moderately broad. Bullae relatively large and inflated.

Upper molars lacking the anterointernal cusp of M.1; this tooth has an anterior lamina consisting of T.2 and T.3; behind this, T.4, 5, 6 and T.7, 8, 9 are all developed and functional in the young animal, but the third lamina is often narrower than the second. M.2 has a vestigial T.3 (often barely traceable); the second and third lamina are like those of M.1. M.3 is small, but not excessively reduced; two clear laminae are present, the posterior one a little narrower than the anterior one. This tooth is not smaller than in many Murinae, indeed some Murinae, such as *Mus*, have it much more reduced. The cusps tend to wear down rather fast, so that a great number of adult specimens seen are more or less laminate in dental characters. The posterointernal cusp is frequently traceable even in the adult. The main cusps are therefore the same as in *Beamys*; but the pattern is much less angular and more simplified than in that genus. The laminae are broad, and tend to project outwards. M.1 appears four-rooted. One skull in the British Museum has a fourth (posterior) molar in the upper jaws. The lower teeth have the usual Murine elements; the outer subsidiary cusps are originally present, though not large; the terminal heel of M.1 and M.2 rather small. M.3 is bilaminate, not particularly reduced.

Mandible normal, with well-developed coronoid process. Form thickset; fur very soft; ear moderate. Tail strongly shortened, most often less than half head and body length. Forefoot small, but digits normal. Hindfoot broad, and strongly shortened, the outer digits not specially reduced. Mammae 4—2 = 12 (Shortridge). A specimen of *mashonae* at the B.M. is labelled as with 3—2 = 10. Cheekpouches are present. The hindfoot is only about 16 per cent of head and body length, on average. I can suggest no reason for this peculiar shortening. The animals seem to be slow-moving, inoffensive creatures judging by captivity specimens, and as far as I know are purely ground dwellers, though one specimen I have had contact with showed a facility for climbing which was rather surprising. The young are apparently born more or less hairy, or so I am told, not naked as in many Mice; according to Flower, *Acomys* resembles *Saccostomus* in this respect.

On account of the suppression of the anterointernal cusp, this genus has been referred to the Dendromyinae; but, as in the case of *Beamys*, no real cusp reduction has taken place in this genus, and it is probably more correctly regarded as an isolated member of the Murinae. (If suppression of one cusp is to be regarded as a subfamily character, *Mastacomys* from Tasmania will also have to have a subfamily, though in this case it is the anteroexternal, not anterointernal, which has gone.) This genus does not show any great reduction of M.3, which characterizes the Dendromyinae. As figured by Tullberg, and as stated by this author, the molars of *Saccostomus* differ considerably from those of *Steatomys* (Dendromyinae). It is an interesting fact that out of all the Murine genera known, so far as I have traced, only three are definitely stated to possess cheekpouches, namely *Beamys*, *Saccostomus* and *Cricetomys*, and in these three alone the anterior lamina of M.1 is characterized by either loss or excessive reduction of T.1. It may be that this is brought about by the possession of these pouches, but one would have expected that the outer cusp might have become modified rather than the inner one. A further instance is the Gerbil *Desmodilliscus*, which possesses cheekpouches, and alone of all Muridae has lost the third lower molar, though retaining the upper one, so that its dental formula as regards cheekteeth is $\frac{3}{2}$. But the suggestion is weakened by the fact that the Palaearctic Hamsters possess large cheekpouches, but nothing highly aberrant has occurred in their dental characters. It is a curious coincidence, if not more, that this peculiar formation in M.1 should occur in these three genera of unrelated African Muridae.

Compared with *Beamys*, the dentition of *Saccostomus* is very much less angular, much simpler, and therefore, according to the view generally held in this work, more specialized.

According to Tullberg, the glans penis of *Saccostomus* resembles that of *Cricetomys*, and the caecum is enlarged in a similar manner.

Forms seen: *anderssoni*, *campestris*, *elegans*, *hildae*, *isiolae*, *mashonae*, *pagei*, *umbriventer*.

I think it is very unlikely that there is more than one valid species of this genus, as indicated by the material examined. Perhaps *isiolae* may stand as being the only form with tail more than half head and body length. Ultimately I think all forms will be regarded as races of *campestris*. Numbers 9 to 13 are not represented in the British Museum.

List of Named Forms

1. SACCOSTOMUS CAMPESTRIS CAMPESTRIS, Peters

1846. Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 258.
Tette, Mozambique, Portuguese E. Africa.
Synonym: *lapidarius*, Peters, 1852, Reise nach Mossambique: Säugeth. p. 167.

2. SACCOSTOMUS CAMPESTRIS ELEGANS, Thomas

1897. Proc. Zool. Soc. London, p. 431.
Karonga, Lake Nyasa, E. Africa.

3. SACCOSTOMUS CAMPESTRIS MASHONAE, de Winton

1896. Proc. Zool. Soc. London, p. 804.
Mazoe, Mashonaland.

4. SACCOSTOMUS CAMPESTRIS HILDAE, Schwann

1906. Proc. Zool. Soc. London, p. 110.
Kuruman, Bechuanaland.

5. SACCOSTOMUS CAMPESTRIS PAGEI, Thomas & Hinton
1923. Proc. Zool. Soc. London, p. 495.
Lehutitung, Central Kalahari.

6. SACCOSTOMUS CAMPESTRIS ANDERSSONI, de Winton
1898. Ann. Mag. Nat. Hist. 7, II, p. 6.
Damaraland, S.-W. Africa.

7. SACCOSTOMUS CAMPESTRIS UMBRIVENTER, Miller
1910. Smiths. Misc. Coll. LIV, No. 1925, p. 1.
Njoro Osolali, Sotik, Kenya.

8. SACCOSTOMUS ISIOLAE, Heller
1912. Smiths. Misc. Coll. LIX, no. 16, p. 14.
Isiola River, N. Guaso Nyiro, Kenya.

(The following have not been examined.)

9. SACCOSTOMUS MEARNSI, Heller
1910. Smiths. Misc. Coll. LIV, No. 1924, p. 3.
Changamwe, Kenya.

10. SACCOSTOMUS FUSCUS, Peters
1852. Reise nach Mossambique: Säugeth. p. 168, pl. 36, fig. 4.
Inhambane, Mozambique.
(Probably an individual variation of *campestris*, according to Thomas & Wroughton, Proc. Zool. Soc. London, p. 295, 1907.)

11. SACCOSTOMUS LIMPOPOENSIS, Roberts
1914. Ann. Transv. Mus. IV, p. 183.
Sand River, N.-W. Transvaal.

12. SACCOSTOMUS CRICETULUS, G. M. Allen & Lawrence
1936. Bull. Mus. Comp. Zool. Harvard Coll. LXXIX, no. 3, p. 100.
South bank of Greeki River, Sabei district, due north of Mt. Elgon, Uganda.

13. SACCOSTOMUS STREETERI, Roberts
1914. Ann. Transv. Mus. IV, p. 183.
Hector Spruit, Transvaal.

Genus 70. CRICETOMYS, Waterhouse

1840. CRICETOMYS, Waterhouse, Proc. Zool. Soc. London, p. 2.

TYPE SPECIES.—*Cricetomys gambianus*, Waterhouse.

RANGE.—African: Sudan, Kenya, Uganda, Zanzibar; Liberia, Nigeria, Fernando Po, Gaboon, Congo, Angola; Nyasaland, Mozambique, Transvaal.

NUMBER OF FORMS.—Twenty-eight are named.

CHARACTERS.—Very large. Cheekteeth differing from normal Murinae in that the inner cusps of the upper series are becoming vestigial. Skull long and narrow, with narrow braincase, relatively long rostrum, the nasals somewhat broadened anteriorly. Supraorbital ridges well developed, extending back to the occipital region, which is upstanding and strong. Paroccipital process noticeably lengthened. Bullae small. Incisive foramina very short, often situated mostly in premaxillae. Palate normal. Jugal very long for a Murine, taking up most of zygoma, relatively broad. Infraorbital foramen very wide, rounded, often little narrowed below. Zygomatic plate moderately narrow, though tilted upwards. Incisors medium. Mandible with high coronoid process.

Upper cheekteeth: M.1 with only two functional cusps, T.2 and T.3, on the front lamina; T.1 very reduced, and very much displaced backwards, so that apparently it never is joined to the front lamina, even when cut, but is joining T.5 (of the second lamina), as a rule, and in old age even becomes merged into the second lamina. T.5 and T.6 like the two cusps in front of them, but T.4 pushed backwards in a similar manner to T.1, so that it joins the lamina behind it. The posterior lamina consists of T.8 and T.9, also a posterior supplementary cusp, which may wear out in M.1 but seems fairly constantly traceable in M.2. M.2 with a small T.1 (joined to T.5, and distorted backwards, as in the front molar); the two posterior laminae are like those of M.1. A small T.3 may also be present. M.3 large, nearly as large as M.2, but evidently without T.1, which I have only seen clearly present in one specimen. In a few skulls seen with the teeth cutting, the pattern appears to be just as described above. On account of the extra posterior cusp, M.1 and M.2 have four outer cusps, as in some complex-toothed Oriental and Australasian types. M.2 is nearly as large as M.1. M.1 is three-rooted. The lower teeth are complex, evidently with the usual Murine elements present; the terminal heel is well developed in M.1 and M.2, also the outer subsidiary cusps as a rule, particularly the anteroexternal of M.2. Small extra subsidiary cusps are sometimes present in both upper and lower teeth.

Size large, usually over 300 mm. head and body, up to 450 (St. Leger). Large cheekpouches present. Fur may be soft or rather rough, but seems to me to vary individually rather than specifically. Ear moderately large. Hindfoot rather broad, with six plantar pads; the three central digits not lengthened, the outer digits not reduced. Forefoot normal. Tail usually or always longer than head and body, the terminal portion pale in colour as a rule, the tail moderately haired. In the living animal, when walking, the tail is not dragged along the ground, but always held erect and seems to be used as a sort of balancing organ. The stomach, according to Tullberg, is very complex, and the caecum enlarged. Alone of all Muridae examined by this author except some Madagascar genera, the tongue is stated to possess three papillae circumvallatae, instead of the usual one. Mammae 8 or 10 (Shortridge). Tullberg has pointed out that this genus is very isolated among Murinae, and suggests that it may have been derived from other ancestors than the remainder of the Murinae, a view which is here suggested. It seems in fact that the molar structure is alone nearly sufficient for it to be removed to a subfamily; but *Saccostomus* and *Beamys*, as pointed out elsewhere, parallel it to a certain degree, in that the anterointernal cusp is reduced (though actually suppressed in those genera), perhaps on account of cheekpouches being present. But in those genera, the posterointernal

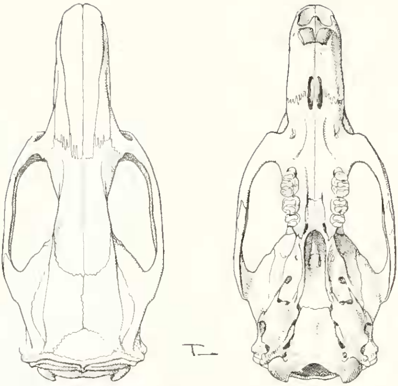

FIG. 17. CRICETOMYS GAMBIANUS GAMBIANUS, Waterhouse.
B.M. No. 32.8.1.23, ♂; × 1.

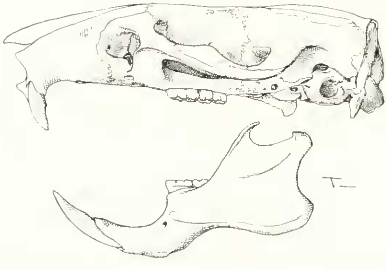

FIG. 18. CRICETOMYS GAMBIANUS GAMBIANUS, Waterhouse.
B.M. No. 32.8.1.23, ♂; × 1.

cusp has not been suppressed, whereas in *Cricetomys* it is absent. The genus seems to be a specialized offshoot of some very generalized type.

These Rats are slow-moving, good-tempered, in my opinion, considerably intelligent, and very attractive in captivity. They have good captivity lives, but for some reason have not yet bred in this country. When excited or pleased they make a chirruping noise reminiscent of a canary.

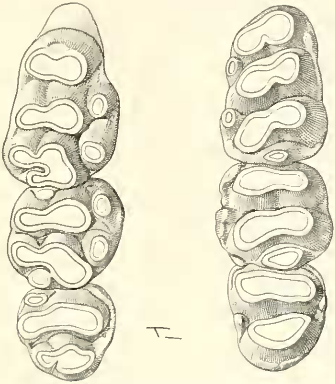

FIG. 19. CRICETOMYS GAMBIANUS GAMBIANUS, Waterhouse.
Cheekteeth: B.M. 32.8.1.23, ♂; × 7.

Forms seen: *adventor*, *ansorgei*, *buchanani*, *cosensi*, *cunctator*, *dichrurus*, *dolichops*, *elgonis*, *emini*, *gambianus*, *grahami*, *kenyensis*, *liberiae*, *luteus*, *oliviae*, *osgoodi*, *poensis*, *proparator*, *sanctus*, *servorum*, *viator*, *vaughanjonesi* (*Cricetomys emini vaughanjonesi*, St. Leger, 1937, North Rhodesia).

I am quite unable to distinguish between any of the standing "species," and regard all forms as races of the type.

LIST OF NAMED FORMS

1. CRICETOMYS GAMBIANUS GAMBIANUS, Waterhouse

1840. Proc. Zool. Soc. London, p. 2.
Gambia, W. Africa.
Synonym: *goliath*, Rüppell, 1842, Mus. Senckenb. III, p. 114.

2. CRICETOMYS GAMBIANUS LIBERIAE, Osgood

1910. Ann. Mag. Nat. Hist. 8, V, p. 283.
50 miles inland from Monrovia, Liberia.

3. CRICETOMYS GAMBIANUS DICHRURUS, Osgood
1910. Ann. Mag. Nat. Hist. 8, V, p. 280.
Anambara River, S. Nigeria.

4. CRICETOMYS GAMBIANUS OLIVIAE, Dollman
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 258.
Bornu, N. Nigeria.

5. CRICETOMYS GAMBIANUS SERVORUM, Hinton
1919. Ann. Mag. Nat. Hist. 9, IV, p. 288.
Lagos, Nigeria.

6. CRICETOMYS GAMBIANUS BUCHANANI, Thomas & Hinton
1921. Nov. Zool. XXVIII, p. 7.
Farniso, near Kano, N. Nigeria.

7. CRICETOMYS GAMBIANUS POENSIS, Osgood
1910. Ann. Mag. Nat. Hist. 8, V, p. 279.
Bubi Town, Bantabiri, Fernando Po.

8. CRICETOMYS GAMBIANUS DOLICHOPS, Osgood
1910. Ann. Mag. Nat. Hist. 8, V, p. 280.
Como River, 70 miles from Gaboon.

9. CRICETOMYS GAMBIANUS LANGI, Hatt
1934. Amer. Mus. Nov. 708, p. 5.
Faradje, Upper Uelle, Congo.

10. CRICETOMYS GAMBIANUS EMINI, Wroughton
1910. Ann. Mag. Nat. Hist. 8, V, p. 106.
Gadda, Monbuttu, N.-E. Congo.

11. CRICETOMYS GAMBIANUS SANCTUS, Hinton
1919. Ann. Mag. Nat. Hist. 9, IV, p. 286.
Inkongo, Sankaru, Belgian Congo.

12. CRICETOMYS GAMBIANUS MICROTIS, Lonnberg
1917. Kungl. Svenska Vet. Akad. Handl. Stockholm, 58, art. 2, p. 77.
Masisi, west of Lake Kivu, Central Africa.

13. CRICETOMYS GAMBIANUS ANSORGEI, Thomas
1904. Ann. Mag. Nat. Hist. 7, XIII, p. 412.
Pungo Andongo, N. Angola.

14. CRICETOMYS GAMBIANUS DISSIMILIS, Rochebrune
1885. Bull. Soc. Philom. 7, IX, p. 86.
Landana, Cabinda, N. Angola.
Synonym: *tephrus*, Rochebrune, 1885, Bull. Soc. Philom. 7, IX, p. 87.

15. CRICETOMYS GAMBIANUS VIATOR, Thomas
1904. Ann. Mag. Nat. Hist. 7, XIII, p. 413.
Likangala, Nyasaland.

16. CRICETOMYS GAMBIANUS ADVENTOR, Thomas & Wroughton
1907. Proc. Zool. Soc. London, p. 295.
Coguno, Inhambane, Portuguese E. Africa.

17. CRICETOMYS GAMBIANUS CUNCTATOR, Thomas & Wroughton
1908. Proc. Zool. Soc. London, p. 171.
Tambarara, Portuguese E. Africa.

18. CRICETOMYS GAMBIANUS HAAGNERI, Roberts

1926. Ann. Transv. Mus. XI, p. 252.
Zoutspansberg, Transvaal.

19. CRICETOMYS GAMBIANUS COSENSI, Hinton

1919. Ann. Mag. Nat. Hist. 9, IV, p. 286.
Zanzibar.

20. CRICETOMYS GAMBIANUS KENYENSIS, Osgood

1910. Field Mus. Nat. Hist. Zool. ser. X, p. 9.
South side of Mt. Kenya.

21. CRICETOMYS GAMBIANUS LUTEUS, Dollman

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 124.
Igembi Hills, north-east of Mt. Kenya.

22. CRICETOMYS GAMBIANUS RAINEYI, Heller

1912. Smiths. Misc. Coll. LIX, no. 16, p. 15.
Mt. Gargues, Matthews Range, Kenya.

23. CRICETOMYS GAMBIANUS ENGUVI, Heller

1912. Smiths. Misc. Coll. LIX, no. 16, p. 16.
Taita Hills, Kenya.

24. CRICETOMYS GAMBIANUS OSGOODI, Heller

1912. Smiths. Misc. Coll. LIX, no. 16, p. 16.
Mazeras, Kavirondo, Kenya.

25. CRICETOMYS GAMBIANUS PROPARATOR, Wroughton

1910. Ann. Mag. Nat. Hist. 8, V, p. 107.
E. Ruwenzori, Uganda.

26. CRICETOMYS GAMBIANUS ELGONIS, Thomas

1910. Ann. Mag. Nat. Hist. 8, V, p. 198.
South face Mt. Elgon, Kenya.

27. CRICETOMYS GAMBIANUS GRAHAMI, Hinton

1919. Ann. Mag. Nat. Hist. 9, IV, p. 283.
Nuba Mountains, S.-E. Sudan.

28. CRICETOMYS GAMBIANUS KIVUENSIS, Lönnberg

1917. Kungl. Svenska Vet. Akad. Handl. Stockholm, 58, art. 2, p. 75.
Masisi, Belgian Congo.

Genus 71. PHLOEOMYS, Waterhouse

1839. PHLOEOMYS, Waterhouse, Proc. Zool. Soc. London, p. 108.

TYPE SPECIES.—*Mus* (*Phloeomys*) *cumingi*, Waterhouse.

RANGE.—Philippine Islands: Luzon, Manila.

NUMBER OF FORMS.—Two.

CHARACTERS.—Size very large, easily the largest member of the subfamily, indeed of the whole family. Head and body length 485 mm. (Taylor), or perhaps more. Skull highly modified, with extremely reduced bullae, and postorbital process present. Cheekteeth a series of plain straight transverse plates.

Skull with short broad rostrum, this thick and heavy, and with powerful supraorbital ridges, which extend far backwards, and are much raised, and jut out in front of the squamosals to form large postorbital processes. The interorbital constriction, which is not well marked, is placed rather far back. Between the postorbital ridges, the skull is deeply depressed. Occipital region strong, prominent, but narrow. Paroccipital process long; bullae extremely reduced. Basioccipital between them broader than usual. Palate relatively broad, rather noticeably sloping downwards posteriorly. Incisive foramina shortened, not approaching the toothrow. Zygomatic plate broad, slanting backwards a little above; infraorbital foramen abnormally narrowed both above and below. Incisors extremely broad. Zygoma robust, except the jugal which is noticeably narrow and short. Mandible not abnormal.

Upper molars with no traces of cusps in the small series examined, the laminae plain and straight, perhaps less tightly packed together than is usual; the laminae 3—2—2, the posterior lamina of M.3 shorter than the others. The third lamina of M.1 and M.2 is as broad as the others, suggesting that the posterointernal cusp may have been present originally. In the lower teeth, M.1 has four laminae, the first narrower and rounded, often with an isolated island in the centre; the fourth confined to the outer side of the tooth, and perhaps representing the terminal heel of more normal Murinae. M.2 with three laminae, the posterior also confined to the outer side. M.3 with two laminae of nearly equal size.

Fur relatively thick and soft in *pallidus*, harsher in the type, which differs in its darker colour. Ear small. Feet arboreal, foreclaws very large; D.3 and D.4 subequal and slightly longer than D.2 and D.5 in the forefoot; D.5 of hindfoot nearly as long as the three central digits; hallux quite long, and all digits bearing large claws. Tail uniformly haired, but not bushy (compare *Crateromys*); with a profuse growth of stiff hairs throughout. According to Taylor there are "mammae 1—1, inguinal."

REMARKS.—This genus is usually regarded as type of a distinct subfamily the Phloeomyinae. This subfamily was erected by Alston, and contained also *Nesokia*. *Nesokia* is less specialized than *Phloeomys* in dental characters, and is, moreover, connected by *Bandicota* with more normal Rats. Although I have seen no *Phloeomys* with unworn teeth, it seems safe to assume that the genus is descended from cuspidate ancestors like the rest of the Murinae, and it would be an interesting fact to ascertain whether the young show any signs of cusping or not. Miller & Gidley define the Phloeomyinae as "upper cheekteeth with triserial arrangement of elements obscured by flattening out of each trio of tubercles to form a single detached transverse lamina; crowns moderately hypsodont; braincase relatively small and auditory bullae reduced; external form heavy, arboreal."

But *Nesokia* approaches the present genus fairly closely in molar pattern; the braincase is relatively small in most of the Indo-Malayan and Australasian Giant Rats, and in *Crateromys* more so than in the present genus; the bullae are not very much more reduced than in some species of *Rattus*, *Dacnomys*, *Mallomys*, *Hyomys* and others, and the slightly arboreal characters are duplicated in all the other Oriental Giant Rats, to a greater or lesser degree.

The genus is referred to the Murinae by Winge, but not by Tullberg.

Tate transferred to the Phloeomyinae all the complex-toothed Rats of the Indo-Malayan. They were regarded as "Muridae with complexly-folded molars" (p. 612). As *Phloeomys* is the most strictly simple-toothed form in the whole area, the name at least is singularly inappropriate; and if this classification were retained, such forms as *Apodemus* must be regarded as a Phloeomyine, to mention only one.

It seems that *Phloeomys*, though extremely specialized, is not of necessity much more distinct from the main Murine stem than such types as *Cricetomys*, etc., and in my opinion is less distinct from them than is *Anisomys*.

Compared with the other Giant Rats, *Crateromys*, *Mallomys*, *Hyomys* and *Cricetomys*, its skull is noticeably broad, besides being larger; all these others are more narrow-skulled types. The dentition of course differs from them all.

Forms seen: *cumingi*, *pallidus*.

List of Named Forms

1. PHLOEOMYS CUMINGI, Waterhouse

1839. Proc. Zool. Soc. London, p. 108.
Luzon, Philippine Islands.
Synonym: (?) *elegans*, Cabrera, 1901, Bol. Real. Soc. Esp. Hist. Nat. p. 372. Locality unknown (Philippines).
(?) *albayensis*, Elera, 1895, Cat. Sist. Faun. Filipinas, 1, p. 21 (nom. nud.).

2. PHLOEOMYS PALLIDUS, Nehring

1890. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 106.
Luzon, Philippine Islands.

A Note on the Genus Diomys of Thomas

The genus *Diomys* was erected by Thomas in 1917 (Journ. Bombay Nat. Hist. Soc., XXV, p. 203), with type *crumpi*, Thomas (same reference, p. 204), from Pareshnath, Hazaribagh, Behar, India.

It is based on one broken skull, with much-worn teeth, the external characters of which are not known. Apparently nothing more has been heard of it. The front molar is stated by Thomas to lack the anteroexternal cusp, T.3; but this may have been brought about by wear, as in very old age, this cusp may become more or less untraceable in other forms. The infraorbital foramen appears rather narrow, and the lower incisors long. Thomas compared the skull with *Millardia*, from which it is evidently distinct. It may be that it represents a valid genus, but having no external characters to compare it with other genera, and no undamaged skull, I find it quite impossible to include it in the present classification.

Genera Unrepresented at the British Museum

African

1. NILOPEGAMYS, Osgood

1928. Field Mus. Nat. Hist. Zool. ser. XII, p. 185.

Type.—*N. plumbeus*, Osgood (same reference). Tributary of Little Abbai, Gojam, Abyssinia.

Described as related to the *Rattus* rats of Africa (*Mastomys*, etc.), but modified towards aquatic life. Ear small. Hindfoot enlarged, about 27 per cent head and body length.

2. LEIMACOMYS, Matschie

1893. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 107.

Type.—*L. buttneri*, Matschie (same reference, p. 109). Bismarckburg, Togo, Dahomey.

Tail shortened. Probably most nearly allied either to *Steatomys* or *Lophuromys*. I have no notes on its dental details.

Indo-Malayan

3. MELASMOTHRIX, Miller & Hollister

1921. Proc. Biol. Soc. Washington, XXXIV, p. 93.

Type.—*Melasmothrix naso*, Miller & Hollister (same reference). Rano Rano, Middle Celebes.

Described as superficially like *Echiothrix* (if so, a very distinct genus), skull like *Echiothrix*, but pterygoids normal; zygomatic plate situated over M.1. Head and body 125 mm. Tail shortened, 90 mm.

4. TRYPHOMYS, Miller

1910. Proc. U.S. Nat. Mus. XXXVIII, p. 399.

Type.—*T. adustus*, Miller (same reference). Benguet, Luzon, Philippine Islands.

Based apparently on one old specimen; the most noticeable characters from the genus description are that the infraorbital foramen is large, that the outer digits of the hindfoot are much reduced, and the posterior palate said to be slightly abnormal. Mammae (10) as in *Rattus rattus* group.

5. TARSOMYS, Mearns

1905. Proc. U.S. Nat. Mus. XXVIII, p. 453.

Type.—*T. apoensis*, Mearns (same reference). Mindanao, Philippine Islands.

If distinguishable from *Rattus*, it will be on a character of the plantar pads of the hindfeet. Much work remains to be done on this character within the genus *Rattus*.

6. LIMNOMYS, Mearns

1905. Proc. U.S. Nat. Mus. XXVIII, p. 451.

TYPE.—*L. sibuanus*, Mearns (same reference, p. 452). Mount Apo, Mindanao, Philippines.

Other Forms:

L. mearnsi, Hollister

1913. Proc. U.S. Nat. Mus. XLVI, p. 324.
Grand Malindang Peak, Mindanao, Philippines.

L. picinus, Hollister

1913. Proc. U.S. Nat. Mus. XLVI, p. 325.
Mt. Halcon, Mindoro. Philippines.

From the original description, this genus has not a single character to distinguish it from *Rattus*. This conclusion is apparently reached by Thomas (Proc. Zool. Soc. London, 1907, p. 141).

Australasian

7. LORENTZIMYS, Jentink

1911. Nova Guinea, 9, p. 174.

TYPE.—*Lorentzimys nouhuysii*, Jentink.

1. LORENTZIMYS NOUHUYSII, Jentink

1911. Nova Guinea, 9, p. 174.
Bivak II, Upper Noord River, Dutch New Guinea.

This was described and has passed into current literature as a jumping species, though Mr. Tate told me that in his opinion the foot is probably scansorial. From Rümmler's key, it does not appear to be very widely distinguishable from *Rattus*, but the toothrows from the few measurements given by Rümmler appear to be nearly as *Macruromys* (i.e. strongly reduced), the palatal foramina are said to be shortened, the skull short, broad and deep, the ear large, and the tail tufted. The size is small, about 85 mm.

In a group as large as this, it is quite impossible for me to include any genus in the key, unless I have actually seen it, so I am compelled for the present not to offer further remarks on the above seven named genera.

MURINAE:
SPECIAL WORKS OF REFERENCE

TATE, Some Muridae of the Indo-Australian Region, Bull. Amer. Mus. Nat. Hist. LXXII, VI, p. 501, 1936.

MILLER, Catalogue Mammals Western Europe, 1912, p. 791; *Apodemus*, *Micromys*, *Rattus*, *Mus*, *Acomys*.

VINOGRADOV, Rodents of U.S.S.R., 1933, Les Mammifères de l'U.R.S.S. 10, Les Rongeurs.

WROUGHTON, Indian Mammal Survey, Journ. Bombay Nat. Hist. Soc. XXVI, p. 783, 1919.

RÜMMLER, Die Systematik und Verbreitung der Muriden Neuguineas, Mitt. Zool. Mus. Berlin, 1938, 23, Heft 1, pp. 1–297.
F. WOOD JONES, Mammals of South Australia, 1923–5.
HOLLISTER, East African Mammals in U.S. Nat. Mus. 1919, Smiths. Inst. U.S. Nat. Mus. 99, part. II, Rodentia, Lagomorpha & Tubulidentata, p. 1.
ST. LEGER, Key to genera of African Rodentia, Proc. Zool. Soc. 1931, p. 958.
TULLBERG, Ueber das System der Nagetiere, 1899. Also a paper, Muriden aus Cameroons (Nova Acta Reg. Soc. Upsal., 3, XVI, 1893).
THOMAS, numerous papers, many of which have been already referred to when dealing with the separate genera. Specially may be mentioned, 1898, Trans. Zool. Soc. London, XIV, p. 378; on Mammals obtained by Mr. John Whitehead during his recent expedition to the Philippines.
SHORTRIDGE, Mammals of South-west Africa, Heinemann, London, 1934, vol. I includes Rodentia.
BRAZENOR, Mem. Nat. Mus. Melbourne, no. 8, p. 74, 1934. Revision of *Notomys*.

Subfamily RHYNCHOMYINAE

1896. THOMAS: Muridae, Rhynchomyinae.

GEOGRAPHICAL DISTRIBUTION.—Philippine Islands; "High Mountains of Central Northern Luzon."

NUMBER OF GENERA.—One.

CHARACTERS.—Cheekteeth $\frac{2}{2}$, so reduced as to be nearly invisible to the naked eye, and appearing practically functionless. Upper incisors extremely reduced. Rostrum greatly elongated.

REMARKS.—The teeth of this genus are, so to speak, "too far gone" for any one to be able to say with certainty whether the form belongs to the Murinae, a genus of which, *Echiothrix*, closely resembles this genus in the extraordinary cranial characters, or to the Hydromyinae, many of which resemble *Rhynchomys* in the molar formula of $\frac{2}{2}$. On this account I think a subfamily must be retained for it.

Thomas transferred *Echiothrix* to this subfamily, but, as I have remarked elsewhere, *Echiothrix* has the dentition of quite a normal member of the Murinae, and the similarity of skull between this genus and *Rhynchomys* may very well be the result of convergent evolution.

Genus 1. RHYNCHOMYS, Thomas

1895. RHYNCHOMYS, Thomas, Ann. Mag. Nat. Hist. 6, XVI, p. 160.

TYPE SPECIES.—*Rhynchomys soricoides*, Thomas.

RANGE.—Monte Data, Luzon, Philippine Islands.

NUMBER OF FORMS.—One.

CHARACTERS.—Skull highly abnormal on account of the greatly elongated rostrum. Nasals with the anterior end projected upwards. No supraorbital ridges present, and little interorbital constriction. Occipital region of skull upstanding, though not ridged Zygomatic plate very narrow, slanting evenly backwards from its lower border. Bullae relatively small. Zygoma narrow, jugal short. Mandible with well-developed coronoid process, the jaw narrow and long. Incisive foramina long, with two grooves running from their posterior ends to the centre of the palate. In front of the minute teeth, there are two ridges, one on each side, running forwards along the outside of the palate; Thomas suggests that these may be used for biting. No enclosed pterygoid fossae. Upper incisors minute; lower incisors less reduced, sharp, but extremely slender. Cheekteeth $\frac{2}{2}$, extremely small; M.1 about twice the size of M.2. They appear more or less simple basin-shaped in form.

Fur soft. Muzzle long. Tail shorter than head and body, moderately haired. Feet not abnormal; D.5 hindfoot longer than hallux, considerably shorter than the three central digits.

Compared with *Echiothrix*, the skull is less robust, while the coronoid process is not reduced.

Forms seen: *soricoides*.

List of Named Forms

1. RHYNCHOMYS SORICOIDES, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 160.
Mt. Data, Luzon, Philippine Islands.

Subfamily HYDROMYINAE

1896. Thomas: Muridae, Hydromyinae.
1899. Tullberg: Muridae, Murini, part.
1918. Miller & Gidley: Muridae, Hydromyinae.
1924. Winge: Muridae, Murini, part, Hydromyes.
1928. Weber: Muridae, Hydromyinae.

Geographical Distribution.—The Australasian region, from New Guinea to Tasmania; and the Philippine Islands (Luzon).

Number of Genera.—Eight, one of which is not represented in the British Museum. The genus *Crunomys*, which is often referred to this subfamily, has been dealt with in the Murinae.

Characters.—Like the Murinae, but cheekteeth more simple, the laminae more or less basin-shaped (the pattern probably originally derived from a Murine pattern in which the outer row of the upper molars becomes suppressed). Infraorbital foramen usually large, and round; zygomatic plate much narrowed, typically (always except *Xeromys*) not cut back above, but nearly straight anteriorly. M.$\frac{3}{3}$ absent or vestigial. Bullae small. In many cases external form much modified for aquatic life.

Key to the Genera of Hydromyinae

(not including the genus *Pseudohydromys* which is not represented in London)

External form much modified for aquatic life. Hindfeet extremely enlarged. Skull modified, of aquatic form (tendency towards heavy flattened braincase, great interorbital constriction, etc., as seen also in the Neotropical Cricetine aquatic Rats, *Ichthyomys*, etc.). Cheek-teeth $\frac{2}{2}$.

Ear vestigial. Tail with highly developed swimming-fringe. Molars smaller. (Incisors narrow) CROSSOMYS

Ear not vestigial. Tail with less developed swimming-fringe. Molars large.

Braincase heavier; frontals less constricted; incisive foramina much shortened. Incisors narrow. PARAHYDROMYS

Braincase lighter; frontals normally more constricted; incisive foramina less shortened; incisors heavier. HYDROMYS

External form not modified for aquatic life. Hindfeet not enlarged. Skull less modified. (Ear normal.)

Upper incisors not strongly pro-odont. Lower incisors not much lengthened. Incisive foramina less shortened.

Nasals normal. Hindfeet much narrowed and lengthened, suggesting a saltatorial type. Zygomatic plate Hydromyine, not cut back above. Cheekteeth $\frac{3}{3}$. LEPTOMYS

Nasals slightly shortened anteriorly. Hindfeet normal. Zygomatic plate Murine, slightly cut back above. Cheekteeth $\frac{2}{2}$. XEROMYS

Upper incisors strongly pro-odont. Lower incisors lengthened. Incisive foramina strongly shortened. (Nasals shortened anteriorly.)

Cheekteeth $\frac{3}{3}$. CHROTOMYS

Cheekteeth $\frac{2}{2}$. CELAENOMYS

I think that with representative material, the last-named would not prove generically distinct from *Chrotomys*.

Genus 1. HYDROMYS, Geoffroy

1804. HYDROMYS, Geoffroy, Bull. Sci. Soc. Philom. Paris, III, 93, p. 253.

TYPE SPECIES.—*Hydromys chrysogaster*, Geoffroy.

RANGE.—Australia (evidently with a wide range, and including Tasmania), New Guinea, Aru Islands, Key Islands, New Britain, Waigeu Island and Goodenough Island (D'Entrecasteaux group).

NUMBER OF FORMS.—Fourteen are recognized by Rümmler.

CHARACTERS.—Skull modified for aquatic life. Nasals shortened anteriorly. Frontals excessively constricted; braincase narrower than in *Parahydromys* and *Crossomys*, lighter. Supraorbital ridges not developed, or barely traceable. Dorsal profile of skull flattened. Bullae very small, basioccipital correspondingly broad. Incisive foramina rather short, considerably in front of toothrows. Toothrows tend to converge anteriorly. Incisors rather long, and heavy. Zygomatic plate relatively very narrow, slightly curved inwards anteriorly, quite different from that of normal Murinae. A strong masseter knob present at lower border of infraorbital foramen; this foramen is large, nearly of even width, scarcely narrowed below, but less open than in *Parahydromys* and *Crossomys*. Mandible without special peculiarities. Cheekteeth $\frac{2}{2}$; molars large; M.1 considerably larger than M.2. The laminae in M.1 take the form of basin-shaped lobes, the centre of each lobe being occupied by a deep depression, the inner side of the first two laminae with a rather prominent cusp, which, however, wears down. Third lamina in M.1 smaller than the anterior two. The outer side of the first two laminae also has a cusp present. M.2 with one main lamina, placed posteriorly, with a small circular heel at the back originally formed by a small outer re-entrant fold, which appears to wear out. In front of this lamina is a small lobe representing probably T.1 of M.2 of normal Murinae. In the lower series, M.2 has two roughly equal-sized lobes; M.1 has two lobes, the anterior larger than the posterior.

Externally modified for aquatic life, though much less highly than *Crossomys*. Ear much less reduced than in that genus, though small. Forefoot with four functional digits, D.3 the longest; the forefoot is very small compared to the hindfoot. Hindfoot very broad and large, with five digits, the outer two shortest; D.3 and D.4 subequal and longest. Fur thick and soft. Tail rather shorter than head and body as a rule, well haired throughout its length. Size largest of subfamily. The webbing of the digits of the hindfeet is moderately developed. Mammae 0—2=4 (Thomas).

Rümmler regards all named forms as races of one species; the material examined tends to support this view.

Forms seen: *beccarii*, *caurinus*, *chrysogaster*, *esox*, *fulvolavatus*, *fuliginosus*, *illuteus*, *longmani*, *melicertes*, *nauticus*, *reginae*.

List of Named Forms

1. HYDROMYS CHRYSOGASTER CHRYSOGASTER, Geoffroy

1804. Bull. Sci. Soc. Philom. Paris, 93, p. 254.
Bruni Island, D'Entrecasteaux Canal, Tasmania.
Synonym: *leucogaster*, Geoffroy, 1804, Bull. Sci. Soc. Philom. Paris, 93, p. 254. Ile Maria, Tasmania.
apicalis, Kuhl, 1820, Beitrag, p. 60.
flaviventer, Owen, 1840–5, Odontography, p. 26.
fulvogaster, Jourdan, 1837, C.R. Acad. Sci. Paris, 5, p. 523.
fulvoventer, Cuvier, 1837, Ann. Sci. Nat. 2, 8, p. 372.

2. HYDROMYS CHRYSOGASTER FULVOLAVATUS, Gould

1853. Mamm. Austr. III, pl. 25.
River Murray, S. Australia.
Synonym: *lutrilla*, Gould, 1853, Mamm. Austr. I, p. xxxvi, ex Macleay MS. Sydney, New S. Wales.

3. HYDROMYS CHRYSOGASTER FULIGINOSUS, Gould

1853. Mamm. Austr. III, p. 27.
King George's Sound, W. Australia.

4. HYDROMYS CHRYSOGASTER CAURINUS, Thomas

1909. Ann. Mag. Nat. Hist. 8, IV, p. 197.
Parry's Creek, Wyndham, N.-W. Australia.

5. HYDROMYS CHRYSOGASTER LAWNENSIS, Troughton

1935. Rec. Austral. Mus. XIX, no. 4, p. 253.
Lawn Hill Creek, N.-W. Queensland.

6. HYDROMYS CHRYSOGASTER LONGMANI, Thomas

1923. Ann. Mag. Nat. Hist. 9, XI, p. 171.
Ravenshoe, N. Queensland.

7. HYDROMYS CHRYSOGASTER REGINAE, Thomas & Dollman

1909. Proc. Zool. Soc. London (1908), p. 789.
Inkerman, Queensland.

8. HYDROMYS CHRYSOGASTER MELICERTES, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 430.
Melville Island, N. Australia.

9. HYDROMYS CHRYSOGASTER GROOTENSIS, Troughton

1935. Rec. Austral. Mus. XIX, no. 4, p. 252.
Groote Eylandt, N. Australia.

10. HYDROMYS CHRYSOGASTER MOAE, Troughton

1935. Rec. Austral. Mus. XIX, no. 4, p. 254.
Moa Island, Torres Straits.

11. HYDROMYS CHRYSOGASTER NAUTICUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 429.
Dobo, Aru Islands.

12. HYDROMYS CHRYSOGASTER BECCARII, Peters

1875. Ann. Mus. Civ. Stor. Nat. Genova, VI, p. 303.
Kei Island.

13. HYDROMYS CHRYSOGASTER ESOX, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 324.
Port Moresby, British New Guinea.
Synonym: *esox illuteus*, Thomas, 1922, Ann. Mag. Nat. Hist. 9, IX, p. 264. Idenberg River, N. Dutch New Guinea.

14. HYDROMYS CHRYSOGASTER NEOBRITTANICUS, Tate & Archbold

1935. Amer. Mus. Nov. 803, p. 8.
Bainings, Balayang, Wide Bay, New Britain; Solomon Islands.

Genus 2. PARAHYDROMYS, Poche

1906. PARAHYDROMYS, Poche, Zool. Anz. XXX, p. 326. To replace
1906. LIMNOMYS, Thomas, Ann. Mag. Nat. Hist. 7, XVII, p. 325. (Not of Mearns.)
1906. DROSOMYS, Thomas, Proc. Biol. Soc. Washington, XIX, p. 199. (To replace *Limnomys*, Thomas.)

TYPE SPECIES.—*Limnomys asper*, Thomas.

RANGE.—New Guinea; originally described from Mount Gayata; subsequently known from other localities, including Dutch New Guinea.

NUMBER OF FORMS.—One.

CHARACTERS.—Compared with *Hydromys*, the nasals appear even more shortened anteriorly; the frontals are less constricted, though with no supraorbital ridges; the braincase is extremely heavy, much broader.

Incisors weaker, narrow. Incisive foramina relatively shorter, more or less confined to the premaxillae. Infraorbital foramen broader, its base more at right angles with ascending branches, so that if it were not considerably higher than wide, its base would form the base of a square. Masseter knob at base of infraorbital foramen poorly developed. Bullae very small. Molars as in *Hydromys*.

Tail considerably longer than head and body, well haired. Ear medium. Hindfoot much larger than forefoot; but webbing of digits apparently little developed. Mammae 0—2 = 4.

According to Tate, Stein remarks that the genus occurs in rocky places in the forest high on the mountains, and is independent of water. It is interesting if this genus is not aquatic, as it appears to be specialized towards aquatic life in quite a similar manner to *Hydromys*, if a little less extremely.

Rümmler in his revision of the Muridae of New Guinea synonymizes this genus with *Hydromys*. I think it is sufficiently distinct to stand as a valid genus.

Forms seen: *asper*.

List of Named Forms

1. PARAHYDROMYS ASPER, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 326.
Mt. Gayata, Richardson Range, British New Guinea.

Genus 3. CROSSOMYS, Thomas

1907. Crossomys, Thomas, Ann. Mag. Nat. Hist. 7, XX, p. 70.

Type Species.—*Crossomys moncktoni*, Thomas.

Range.—Described from Serigina, Brown River, North-east British New Guinea.

Number of Forms.—One.

Characters.—Braincase very large, smoothly rounded and heavy; frontals rather more constricted than in *Parahydromys*; not or faintly ridged. Bullae extremely small. Toothrow situated far forward in skull. Incisive foramina of medium length, less reduced than in *Parahydromys*. Infraorbital foramen very large, shaped like that of *Parahydromys*. Masseter knob at its base well developed. Zygomatic plate very narrow. Incisors evidently narrow. Molars $\frac{2}{2}$, relatively small, more reduced than in the two allied genera.

External form extremely modified for aquatic life. Hindfoot with five digits, the bases of which are webbed. Tail longer than head and body, fully haired, its under surface with a well-developed swimming-fringe, which divides into two rows of hairs near the body. Forefoot extremely small, with four functional digits. Ear practically untraceable. Thomas was of the opinion that the genus represents the most highly specialized aquatic Rodent.

Rümmler regards the genus as a synonym of *Hydromys*. I think that there is not the slightest doubt that *Crossomys* represents a very distinct genus. The vestigial ear and the smaller molars appear to be its main characters; the skull also has quite a different aspect from that of *Hydromys*, but is more like that of *Parahydromys*, which is, however, least modified for aquatic life of the three genera.

Forms seen: *moncktoni*.

List of Named Forms

1. CROSSOMYS MONCKTONI, Thomas

1907. Ann. Mag. Nat. Hist. 7, XX, p. 72.
Serigina, Brown River, N.-E. British New Guinea.

Genus 4. CHROTOMYS, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 161.

Type Species.—*Chrotomys whiteheadi*, Thomas.

Range.—Luzon, Philippine Islands.

Number of Forms.—One.

Characters.—Not modified for aquatic life. Rostrum long, nasals shortened anteriorly. Frontals moderately constricted, not developing ridges apparently. (Three skulls seen only.) Bullae small. Braincase rather broad. Incisive foramina very short, situated about halfway between the front of the toothrows, and the incisors. Zygoma much narrowed; jugal short. Infraorbital foramen narrow, little wider above than below; without a masseter knob at its lower border. Upper incisors broad, strongly pro-odont. Lower incisors much lengthened. Cheekteeth $\frac{3}{3}$, M.3 vestigial. Upper molars like *Hydromys*, but the third lobe of M.1 is smaller, and there is a well-marked extra lobe at the back of M.2. Lower teeth like *Hydromys*, except for the presence of a minute third molar. Muzzle long. Ears medium. Fur thick, with a prominent yellowish middorsal stripe which extends forwards to the forehead present. Tail relatively short, fairly well haired. Hindfoot narrow, though less so than in *Leptomys*. D.5 short, hardly reaching past base of D.4. Forefoot normal.

Forms seen: *whiteheadi*.

List of Named Forms

1. CHROTOMYS WHITEHEADI, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 161.
Mt. Data, Luzon, Philippine Islands.

Genus 5. CELAENOMYS, Thomas

1898 Trans. Zool. Soc. London, XIV, p. 390.

Type Species.—*Xeromys silaceus*, Thomas.

Range.—Luzon, Philippine Islands.

Number of Forms.—One.

Characters.—Skull essentially as in *Chrotomys*. Molars $\frac{2}{2}$, perhaps a little smaller than in *Chrotomys*, but like the two anterior teeth of *Chrotomys* in pattern. External characters like *Chrotomys*, but without a mid-dorsal stripe.

Two skulls only have been seen. It is probable that with a larger series, the genus would be not generically separable from *Chrotomys*. I think little importance should be attached to the presence or absence of M.3 in this group, as when present the tooth is at the point of suppression, and sufficient specimens have never been taken to show whether it is a constant character, or whether, as perhaps in the Bathyergine genus *Heterocephalus*, M.3 with age becomes shed.

Forms seen: *silaceus*.

List of Named Forms

1. CELAENOMYS SILACEUS, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 161.
Mt. Data, Luzon, Philippine Islands.

Genus 6. LEPTOMYS, Thomas

1897. Leptomys, Thomas, Ann. Mus. Civ. Stor. Nat. Genova, XVIII, p. 610.

Type Species.—*Leptomys elegans*, Thomas.

Range.—New Guinea.

Number of Forms.—Two.

Characters.—Nasals normal, projecting forwards to level of incisors. Little interorbital constriction present in skull, and no supraorbital ridges in the few seen. Incisive foramina considerably less reduced than in *Chrotomys*, though short and not approaching M.1. Zygoma narrow, and jugal short. Zygomatic plate narrow; infraorbital foramen rather larger than in *Chrotomys*, and without masseter knob.

Cheekteeth $\frac{3}{3}$; M.1 of the upper series like *Chrotomys*, the depressions deep, the third lobe reduced. M.2 like *Chrotomys*; M.3 very small. Lower teeth originally with high cusps, more Murine than in allied genera, though evidently simplifying with wear. Incisors not pro-odont.

Mammae 0—2=4. Ear medium. Form less thickset than in *Chrotomys*. Tail subequal in length to head and body, scaly, very poorly haired. Hindfoot narrow and lengthened, the three centre digits considerably longer than D.5, which is slightly longer than the hallux. Forefoot normal.

Forms seen: *elegans*.

List of Named Forms

1. LEPTOMYS ELEGANS, Thomas

1897. Ann. Mus. Civ. Stor. Nat. Genova, XVIII, p. 610.
British New Guinea.

2. LEPTOMYS ERNSTMAYRI, Rümmler

1932. Das Aquarium, VI, p. 135.
Saruwaged Mountains, Huon Peninsula, New Guinea.

Genus 7. XEROMYS, Thomas

1889. Xeromys, Thomas, Proc. Zool. Soc. London, p. 248.

Type Species.—*Xeromys myoides*, Thomas.

Range.—Queensland.

Number of Forms.—One.

Characters.—Form Mouselike. Cheekteeth $\frac{2}{2}$. Skull with little interorbital constriction; nasals rather shortened anteriorly; no supraorbital ridges; braincase rather heavy; bullae small. Incisive foramina of medium length, not approaching M.1. Incisors thick, inclined to be slightly pro-odont, the upper ones of the type skull orange, the lower ones white. Infraorbital foramen and zygomatic plate more Murine than in other genera; the zygomatic plate very slightly cut back above. Cheekteeth with in the upper series M.1 nearer *Chrotomys* than *Hydromys*, but differing from the former in that the third lobe is about as large as the first and second; M.2 with short inner front lobe, as usual, and the posterior lobe well developed, with a small heel. M.1 lower with two lobes, the anterior one with a small inner and outer fold in the front portion, M.2 two-lobed. M.2 upper is rather simpler than in *Chrotomys*.

Mammae 0—2=4. Tail a little longer than head and body, not well haired. Hindfeet normal, but D.5 relatively short. D.5 forefoot considerably reduced.

Only one skin and skull seen.

Forms seen: *myoides*.

List of Named Forms

1. XEROMYS MYOIDES, Thomas

1889. Proc. Zool. Soc. London, p. 248.
Port Mackay, Queensland.

(Genus not represented in London)

1. PSEUDOHYDROMYS, Rümmler

1934. Zeitschr. für Säugetierk. 9, p. 47. From New Guinea.

Type.—*Pseudohydromys murinus*, Rümmler.

1 PSEUDOHYDROMYS MURINUS, Rummler

1934. Zeitschr. für Säugetierk. 9, p. 48.
Morobe, Mt. Misim, N.-E. New Guinea.

This is from description a small Mouse (head and body 91), with apparently simple *Hydromys*-like molars (cheekteeth $\frac{2}{2}$), the external form not modified for aquatic life, and as figured by Rümmler, the incisors not pro-odont, and the zygomatic plate as in *Hydromys* (i.e. not resembling that of *Xeromys*). From Rümmler's measurements, the hindfoot is proportionately shorter than in *Leptomys*. The form seems well differentiated from other genera.

HYDROMYINAE:
SPECIAL WORKS OF REFERENCE

TATE, 1936, Bull. Amer. Mus. Nat. Hist. LXXII, p. 642. Some Muridae of the Indo-Australian Region.
RÜMMLER, 1938, Die Systematik und Verbreitung der Muriden Neuguineas. Mitteilung. aus dem Zool. Mus. Berlin, Band 23, Heft. 1, pp. 1–297.

Subfamily DENDROMYINAE

1896. Thomas: Muridae, Dendromyinae, part, included *Deomys*.
1899. Tullberg: Muridae, Murini, part.
1918. Miller & Gidley: Muridae, Dendromyinae (but their diagnosis included "manus with only three functional digits," which appears to restrict the group to *Dendromus* only; they do not give a list of genera).
1924. Winge: Murini, Mures, part.
1928. Weber: Muridae, Murinae, part.

The group is called Dendromurinae by G. M. Allen in his Check List of African Mammals (1939).

GEOGRAPHICAL DISTRIBUTION.—Africa, south of the Sahara.

NUMBER OF GENERA.—As here understood, five. (The unrepresented *Leimacomys*, Matschie, which has been listed with the Murinae, may belong here.)

CHARACTERS.—Like the Murinae, but with the inner row of cusps of the upper cheekteeth becoming more reduced, so that there is only one functional inner cusp present on the first and second molars. M.$\frac{3}{3}$ vestigial.

REMARKS.—The genera referred to this group might perhaps be referred to the Murinae, as it will be seen that neither Tullberg nor Weber retain this subfamily. Miller & Gidley regard it as the most primitive group of their Muridae, with the triserial arrangement of the cusps of the upper molars "not fully developed." The opposite view is taken here, namely, that the primitive triserial arrangement has become much reduced. To this group have been added *Beamys* and *Saccostomus*. Though genera like these might be ancestral, I have already given my reasons for retaining them in the Murinae when dealing with that group; moreover, if they are placed in this subfamily, it seems that *Cricetomys* probably should be also.

Of the genera retained here in the subfamily, *Dendromys* and *Steatomys* appear very closely allied to each other, though the former has become specialized for arboreal life, and has lost its fifth finger, and appears about to lose the claw of the fifth hindtoe (or in many species has lost it).

Notwithstanding its many extreme specializations, such as loss of hallux, abnormal form of skull, specialized posterior palate, and its rather generalized complex teeth, I think *Malacothrix* is a near ally of these genera. Whether *Prionomys* has evolved independently a similar arrangement of cusps of molars, and much reduced M.3, is not clear; certainly its molars are not like those of the above-mentioned genera in many characters, and the cusps recall those of *Oenomys* in their strong enlargement. *Petromyscus* is referred to the Dendromyinae by Hinton, and is retained here; but I am not altogether convinced that this group of small Mice is not another South African representative of the Cricetinae; in many ways their molars seem to me to be, at least in the adult, very similar to many forms of that subfamily, and very unlike those of Dendromyinae as here understood.

Key to the Genera of Dendromyinae

Infraorbital foramen enlarged, but without conspicuous ridging of outer border, and without masseter knob. Cheekteeth with cusps abnormally raised up, the rows separated by deep valleys; upper incisors pro-odont. (Manus with four, pes with five digits.) — Prionomys

Infraorbital foramen when enlarged with outer border conspicuously ridged, and with strong masseter knob. Cheekteeth with cusps never abnormally raised up. Upper incisors not pro-odont.

- Infraorbital foramen as in normal Muridae. (Manus with four, pes with five digits.) — Petromyscus
- Infraorbital foramen enlarged, its outer border prominently ridged; a large masseter knob present at its lower border.
  - Hindfoot with four digits only, the hallux suppressed. Pterygoid fossae unusually broad, and posterior nares extremely narrow. Cheekteeth narrowed; frontals abnormally constricted. — Malacothrix
  - Hindfoot with five digits, the hallux retained. (Not combining cranial characters as noted above.)
    - Forefoot with three digits. Tail long, prehensile. (Pygmy arboreal forms.) — Dendromus
    - Forefoot with four digits. Tail relatively short. Not specialized for arboreal life. — Steatomys

Genus 1. DENDROMUS, Smith

1829. Dendromus, Smith, Zool. Journ. IV, p. 438.
1916. Poemys, Thomas, Ann. Mag. Nat. Hist. 8, XVIII, p. 238. (*Dendromus melanotis*, Smith.)
1916. Chortomys, Thomas, Ann. Mag. Nat. Hist. 8, XVIII, p. 238. (*Dendromys lovati*, de Winton.) Valid as a subgenus.

Type Species.—*Dendromus typicus*, Smith = *Mus mesomelas*, Brants.

Range.—African: Abyssinia, Kenya, Uganda, Tanganyika; Congo, Cameroons, Nigeria; Angola, South-west Africa, Rhodesia, Nyasaland, South Africa.

Number of Forms.—About forty-four.

Characters.—Very small. Skull with considerable interorbital constriction; braincase round and moderately large. Supraorbital ridges rarely traceable. Incisive foramina broad, long, reaching usually about the level of the middle of M.1. Palate broad. Bullae relatively large. Infraorbital foramen very large, the zygomatic plate narrow, but well tilted upwards; a prominent masseter knob present. Upper incisors compressed, one-grooved. Cheekteeth rather narrow; M.3 minute. M.1 with T.2 and T.3, narrow and close together; T.4, 5 and 6 representing the second lamina, the inner cusp (T.4) small; T.8 and 9 representing the last lamina, and sometimes traces of a fourth outer posterior cusp. M.2 with a vestigial T.3; the other cusps as in the posterior laminae of M.1. Sometimes an extra cusp in front of the front lamina in M.1 is present. Lower incisors plain; cheek teeth with M.3 small; M.2 often noticeably large, as large sometimes as M.1; the pattern evidently not highly abnormal, and not far removed from the Murine type.

Manus with three digits only, D.5 suppressed entirely as a rule. Hindfoot with very short hallux, D.5 nearly as long as the three central digits, and often clawless; its claw when present is minute. Tail long, said to be prehensile, and not well haired. A middorsal stripe may be present or absent; or in *D. lovati* there are three stripes on the back.

Thomas divided the genus into three subgenera:

Dendromus s.s.: back single-striped (or without stripe), D.5 of hindfoot retaining the vestigial claw.

"*Poemys*" like *Dendromus* cranially and dentally, but D.5 of hindfoot without claw.

Chortomys: back three-striped; D.5 of hindfoot said to have a minute claw (though in some specimens it seems to be suppressed); upper profile of skull is strongly reminiscent of the abnormal condition of *Malacothrix* (excessive interorbital constriction, widely spreading zygomata, etc.).

There appears to be some difference of opinion at the moment as to the limits of "*Poemys*" and *Dendromus*. For instance, G. M. Allen lists *whytei*, *ruddi*, *ochropus*, *acraeus* and *lineatus* as *Poemys*, whereas Hollister states they are all *Dendromus*. Shortridge, 1934, gives generic rank to *Poemys* because of its "many differences both in structure and habits" (as observed in South Africa). There appears, however, to be no doubt that *Poemys* is a synonym of *Dendromus*. It is possible that the possession of the minute claw or the nail may be an age character. There are unquestionably far too many distinct "species" standing at present in this genus.

According to Shortridge, there are 8 mammae present in the genus.

Forms seen: *acraeus*, *ansorgei*, *concinnus*, *exoneratus*, *haymani*, *insignis*, *jamesoni*, *kivu*, *lineatus*, *lovati*, *mesomelas*, *mystacalis*, *melanotis*, *messorius*, *major*, *nigrifrons*, *nyikae*, *nyasae*, *pecilei*, *ruddi*, *shortridgei*, *vulturnus*, *whytei*.

List of Named Forms

Subgenus *Dendromus*, Smith

1. DENDROMUS MESOMELAS MESOMELAS, Brants

1827. Het geslacht der Muizen, p. 122.
Cape of Good Hope, near Zondags River.
Synonym: *typicus*, Smith, Zool. Journ. 4, p. 439, 1829.
ayresi, Roberts, 1913, Ann. Transv. Mus. IV, p. 83. Pondoland.

2. DENDROMUS MESOMELAS MAJOR, St. Leger

1930. Ann. Mag. Nat. Hist. 10, VI, p. 622.
Ssanukanu Village, Grootfontein district, S.-W. Africa.

3. DENDROMUS JAMESONI JAMESONI, Wroughton

1910. Ann. Mag. Nat. Hist. 8, III, p. 247.
Zoutspansberg, Transvaal.

4. DENDROMUS JAMESONI PONGOLENSIS, Roberts

1931. Ann. Transv. Mus. XIV, p. 232.
Pongola River, 15 miles west of Manaba, N. Zululand.

5. DENDROMUS ANSORGEI, Thomas

1905. Ann. Mag. Nat. Hist. 7, XVI, p. 173.
Caconda, Benguella, Angola.

6. DENDROMUS LEUCOSTOMUS, Monard

1932. Bull. Soc. Neuchatel. Sci. Nat. 57, p. 55.
Caluquembe, Benguella, Angola.

7. DENDROMUS NYASAE, Thomas

1916. Ann. Mag. Nat. Hist. 8, XVIII, p. 241.
Nyika Plateau, N. Nyasaland.

8. DENDROMUS INSIGNIS INSIGNIS, Thomas

1903. Ann. Mag. Nat. Hist. 7, XII, p. 341.
Nandi, Kenya.

9. DENDROMUS INSIGNIS KIVU, Thomas

1916. Ann. Mag. Nat. Hist. 8, XVIII, p. 242.
Buhamba, Kivu region, Congo.

10. DENDROMUS INSIGNIS PERCEVALI, Heller

1912. Smiths. Misc. Coll. LIX, 16, p. 5.
Mt. Gargues, Matthews Range, Kenya.

11. DENDROMUS INSIGNIS ABYSSINICUS, Osgood

1936. Field Mus. Nat. Hist. Publ. Zool. ser. XX, p. 235.
East slope of Mt. Albasso, Chilalo Mountains, Arusi, Abyssinia.

12. DENDROMUS LUNARIS, Osgood

1936. Field Mus. Nat. Hist. Publ. Zool. ser. XX, p. 235.
Kalongi, Butangu Valley, western slope of Mt. Ruwenzori, Uganda.

13. DENDROMUS MESSORIUS, Thomas

1903. Ann. Mag. Nat. Hist. 7, XII, p. 340.
Efulen, Cameroons.

14. DENDROMUS OREAS, Osgood

1936. Field Mus. Nat. Hist. Publ. Zool. ser. XX, p. 236.
South-west side of Mt. Cameroon, Cameroon Mandate, British Nigeria.

15. DENDROMUS WHYTEI WHYTEI, Wroughton

1909. Ann. Mag. Nat. Hist. 8, III, p. 247.
Fort Hill, Nyasa.

16. DENDROMUS WHYTEI PALLESCENS, Osgood

1910. Field Mus. Nat. Hist. Publ. Zool. ser. X, 2, p. 7.
Ulukenya Mountains, Kenya.

17. DENDROMUS WHYTEI CAPITIS, Heller

1912. Smiths. Misc. Coll. LIX, 16, p. 6.
Mt. Lololokwi, Matthews Range, Kenya.

18. DENDROMUS RUDDI, Wroughton

1910. Ann. Mag. Nat. Hist. 8, V, p. 275.
Malakisi, Mt. Elgon.

19. DENDROMUS ACRAEUS, Wroughton

1909. Ann. Mag. Nat. Hist. 8, IV, p. 541.
Kirui, Elgon, Kenya.

20. DENDROMUS OCHROPUS, Osgood

1910. Field Mus. Nat. Hist. Publ. Zool. ser. X, 2, p. 6.
Lake Elementeita, Kenya.

21. DENDROMUS LINEATUS, Heller

1911. Smiths. Misc. Coll. LVI, 17, p. 4.
Rhino Camp. Lado Enclave, S. Sudan.

22. DENDROMUS PUMILIO, Wagner

1841. Münch. Gel. Anz. XII, p. 437.
Cape Colony.

23. DENDROMUS MELANOTIS MELANOTIS, Smith

1834. South Afr. Quart. Journ. II, p. 158.
Port Natal, S. Africa.
Synonym: *subtilis*, Sundevall, Ofvers. Kongl. Svenska. Vet. Ak. Forh. Stockholm, 3, 5, p. 120, 1846.

24. DENDROMUS MELANOTIS BASUTICUS, Roberts

1927. Rec. Albany Mus. 3, p. 484.
Basutoland, S. Africa.

25. DENDROMUS MELANOTIS CHIVERSI, Roberts

1929. Ann. Transv. Mus. XIII, p. 116.
Vlakfontein, Parys District, Orange Free State.

26. DENDROMUS MELANOTIS THORNTONI, Roberts

1931. Ann. Transv. Mus. XIV, p. 231.
Port Elizabeth, E. Cape Province.

27. DENDROMUS MELANOTIS CAPENSIS, Roberts

1931. Ann. Transv. Mus. XIV, p. 232.
Wolseley, Cape Province.

28. DENDROMUS MELANOTIS PRETORIAE, Roberts

1931. Ann. Transv. Mus. XIV, p. 232.
Rietondale, Pretoria.

29. DENDROMUS LONGICAUDATUS, Roberts

1913. Ann. Transv. Mus. IV, p. 83.
Tzaneen Estate, Transvaal.

30. DENDROMUS CONCINNUS, Thomas

1926. Proc. Zool. Soc. London, p. 299.
Otjumbumbi, Cunene River, S.-W. Africa.

31. DENDROMUS ARENARIUS, Roberts

1924. Ann. Transv. Mus. X, p. 71.
S. Africa; no locality given.

32. DENDROMUS ANGOLENSIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 115.
Angola.

33. DENDROMUS NYIKAE, Wroughton

1909. Ann. Mag. Nat. Hist. 8, III, p. 248.
Nyika Plateau, Nyasaland.

34. DENDROMUS NAIROBAE, Osgood

1910. Field Mus. Nat. Hist. Zool. ser. X, 2, p. 7.
Nairobi, Kenya.

35. DENDROMUS MYSTACALIS, Heuglin

1863. Verh. Leop. Carol. Akad. III, p. 5.
Central Abyssinia.

36. DENDROMUS PALLIDUS, Heuglin

1863. Verh. Leop. Carol. Akad. III, p. 5.
Tigre, Abyssinia.

37. DENDROMUS NIGRIFRONS NIGRIFRONS, True

1892. Proc. U.S. Nat. Mus. XV, p. 462.
Kilimanjaro, E. Africa.

38. DENDROMUS NIGRIFRONS SPECTABILIS, Heller

1911. Smiths. Misc. Coll. LVI, 17, p. 3.
Rhino Camp, Lado Enclave.

39. DENDROMUS NIGRIFRONS VULTURNUS, Thomas

1916. Ann. Mag. Nat. Hist. 8, XVIII, p. 242.
Chirinda Forest, Melsetta, Rhodesia.

40. DENDROMUS NIGRIFRONS SHORTRIDGEI, St. Leger

1930. Ann. Mag. Nat. Hist. 10, VI, p. 622.
Ssanukanu Village, Grootfontein district, S.-W. Africa.

41. DENDROMUS HAYMANI, Hatt

1934. Amer. Mus. Nov. 708, p. 13.
Mboga, Belgian Congo.

42. DENDROMUS PECILEI, Milne-Edwards

1886. Rev. Scient. xii, p. 16.
W. Africa.

43. DENDROMUS EXONERATUS, Thomas

1918. Ann. Mag. Nat. Hist. 9, II, p. 59.
Panyam, Bauchi Province, N. Nigeria.

Subgenus *Chortomys*, Thomas

44. DENDROMUS LOVATI, de Winton
1899. Proc. Zool. Soc. London, p. 986.
Managasha, near Addis Ababa, Abyssinia.

Genus 2. STEATOMYS, Peters

1846. STEATOMYS, Peters, Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 258.

TYPE SPECIES.—*Steatomys pratensis*, Peters.

RANGE.—African: Sudan, Kenya, Tanganyika; Congo; Nigeria; Gold Coast; Angola; Portuguese East Africa, South-west Africa, South Africa.

NUMBER OF FORMS.—Twenty-five.

CHARACTERS.—Skull with rather pointed rostrum, moderate interorbital constriction, no supraorbital ridges (or these can sometimes be traced). Infraorbital foramen very large, and zygomatic plate narrow, as in *Dendromus*; conspicuous masseter knob present; bullae large. Jugal long. Incisive foramina as in *Dendromus*. Upper incisors grooved, lower incisors plain. Cheekteeth similar to those of *Dendromus*, tending to become laminate with wear.

Form thickset. Fur soft. Foreclaws sometimes rather large; functional digits four in manus, five in pes; the digits normal in proportions. Tail short, about half head and body length as a rule, rather well haired.

Forms seen: *aquilo*, *bocagei*, *cuppedius*, *caurinus*, *gazellae*, *jacksoni*, *loveridgei*, *minutus*, *muanzae*, *pentonyx*, *pratensis*, *swalius*, *umbratus*.

The forms seen divide quite clearly into two groups, the type and allies, smaller forms, adult normally under 100 mm. head and body, and the *bocagei* group, more heavily built forms, in which the head and body length of the adult is usually over 100 mm., including *caurinus*, *bocagei*, *jacksoni*, and more doubtfully *gazellae*, a little-known form with rather larger bullae than is usual in the genus. It must be noted, however, that I have not seen many of the named forms.

Shortridge writes: "The remarkable fatness of *Steatomys*, connected with prolonged hibernating habits, is characteristic of the genus, and without parallel among other South African Rodents." He states that the mammae are 3—2 = 10.

LIST OF NAMED FORMS

pratensis Group

1. STEATOMYS PRATENSIS PRATENSIS, Peters
1846. Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 258.
Mozambique.
Synonym: *edulis*, Peters, 1852, Reise nach Mossambique: Säugeth. p. 163.

2. STEATOMYS PRATENSIS MAUNENSIS, Roberts

1932. Ann. Transv. Mus. XV, p. 11.
Shorobe, Maun district, Ngamiland.

3. STEATOMYS PRATENSIS KASAICUS, Hatt

1934. Amer. Mus. Nov. no. 708, p. 15.
Luluabourg, Kasai district, Belgian Congo.

4. STEATOMYS SWALIUS SWALIUS, Thomas

1926. Proc. Zool. Soc. London, p. 300.
Ondongwa, Ovamboland, S.-W. Africa.

5. STEATOMYS SWALIUS UMBRATUS, Thomas

1926. Proc. Zool. Soc. London, p. 301.
N.-W. Ovamboland, on Cunene River.

6. STEATOMYS LOVERIDGEI, Thomas

1919. Ann. Mag. Nat. Hist. 9, IV, p. 33.
Lumbo, Mozambique.

7. STEATOMYS PENTONYX, Sclater

1899. Ann. S. African Mus. I, p. 202.
Cape Flats, near Cape Town.

8. STEATOMYS MINUTUS, Thomas & Wroughton

1905. Ann. Mag. Nat. Hist. 7, XVI, p. 174.
Fort Quillenges, Benguella, Angola.

9. STEATOMYS MUANZAE, Kershaw

1923. Ann. Mag. Nat. Hist. 9, XII, p. 535.
Nyambita, Mwanza, Tanganyika.

10. STEATOMYS PARVUS, Rhoads

1896. Proc. Acad. Nat. Sci. Philadelphia, p. 529.
Rusia, Lake Rudolf, Abyssinia.

11. STEATOMYS AQUILO, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 264.
Jebel Marra, Darfur, Sudan.

12. STEATOMYS CUPPEDIUS, Thomas & Hinton

1920. Nov. Zool. XXVII, p. 318.
Kano, N. Nigeria.

bocagei Group

13. STEATOMYS BOCAGEI, Thomas

1892. Ann. Mag. Nat. Hist. 6, X, p. 264.
Caconda, Angola.

14. STEATOMYS JACKSONI, Hayman

1935. Proc. Zool. Soc. London, p. 930.
Wenchi, Ashanti, Gold Coast.

15. STEATOMYS CAURINUS, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 271.
Panyam Plateau, N. Nigeria.

16. STEATOMYS GAZELLAE, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 265.
Tamburas, Bahr-el-Ghazal, Sudan.

Not seen, and not allocated to Group

17. STEATOMYS KREBSII KREBSII, Peters
1852. Reise nach Mossambique: Säugeth. p. 165.
Caffraria, S. Africa.

18. STEATOMYS KREBSII ORANGIAE, Roberts
1929. Ann. Transv. Mus. XIII, p. 116.
Orange Free State.

19. STEATOMYS KREBSII TRANSVAALENSIS, Roberts
1929. Ann. Transv. Mus. XIII, p. 117.
Witfontein, Randfontein, Transvaal.

20. STEATOMYS KREBSII KALAHARICUS, Roberts
1932. Ann. Transv. Mus. XV, p. 1.
Central Kalahari, 25 miles west of Damara Pan.

21. STEATOMYS CHIVERSI CHIVERSI, Roberts
1931. Ann. Transv. Mus. XIV, p. 233.
Blood River, Natal.

22. STEATOMYS CHIVERSI TONGENSIS, Roberts
1931. Ann. Transv. Mus. XIV, p. 233.
Manaba, N. Zululand.

23. STEATOMYS OPIMUS, Pousargues
1894. Bull. Soc. Zool. XIX, p. 131.
Balao, Reg. Dakoas, Congo.

24. STEATOMYS NATALENSIS, Roberts
1929. Ann. Transv. Mus. XIII, p. 117.
Bergville, Natal.

25. STEATOMYS ATHI, Heller
1910. Smiths. Misc. Coll. LIV, p. 3.
Ulukenia Hills, Athi Plains, Kenya.

It is very probable that too many species are recognized in this genus.

Genus 3. MALACOTHRIX, Wagner

1843. MALACOTHRIX, Wagner, Suppl. Schrebers Säugeth. III, p. 496.

TYPE SPECIES.—*Otomys typicus*, Smith.

RANGE.—South Africa, South-west Africa.

NUMBER OF FORMS.—Six.

CHARACTERS.—Skull highly abnormal, with extreme interorbital constriction, such as not seen elsewhere in Murinae, and rarely in the present group; rostrum very narrow (and interorbital region no wider than the rostrum); braincase shortened, rounded, slanting downwards posteriorly. Zygomata very widely spreading. Toothrow placed rather far forwards in the skull. Palate extremely broad, the mesopterygoid roofed in by bone, something after the manner of *Acomys*, only the pterygoid fossae are much broader, and deeper, than in that genus, and tend less to meet anteriorly. Bullae medium.

Incisive foramina large and long, reaching about the middle of M.1, and extending forward to the incisors. Zygoma rising abruptly anteriorly to a considerable height; zygomatic plate tilted strongly upwards, with much enlarged masseter knob, which slants abruptly outwards. The ridge of this is continued upwards, the whole outer side of the enlarged infraorbital foramen being prominently ridged. Upper incisors compressed, one grooved. Upper cheekteeth extremely narrow, complex; M.1 long, with an extra cusp in front of T.2; T.2 and T.3 approximately equal; T.1 not entirely suppressed in some cases, and appearing as a minute cusp. The second lamina of M.1 with three cusps; the third lamina with two main cusps, and a small extra outer posterior one. The laminae of the cheekteeth appear less packed together than is usual. M.2 with T.3, and the second and third laminae like those of M.1. M.3 minute. Lower incisors plain. M.3 lower at vanishing point. The pattern of M.1 and M.2 is evidently originated from a *Dendromus*-like pattern, but sometimes in age tends to become more or less prismatic owing to the cusps ceasing to be opposite each other, but alternating, and then the lower molars take on a Cricetine pattern, with quite wide spaces separating the cusps. Mandible not abnormal.

Fur of a peculiar quality. Ear large. Hindfoot extremely narrow, relatively long, with four digits only; alone of all Muridae this genus has lost the hallux; D.5 not much shorter than D.2, 3 and 4. Tail well haired, relatively strongly shortened. Sole of hindfoot hairy. Manus with four functional digits. Mammae 8 (Shortridge).

Forms seen: *typicus*, *egeria*.

List of Named Forms

1. MALACOTHRIX TYPICUS TYPICUS, Smith

1834. South Afr. Quart. Journ. ii, p. 148.
District of Graaff Reinet, S. Africa.

2. MALACOTHRIX TYPICUS FRYI, Roberts

1917. Ann. Transv. Mus. V, p. 268.
Klipriviersorg, Krugersdorp district, Transvaal.

3. MALACOTHRIX TYPICUS MOLOPENSIS, Roberts

1933. Ann. Transv. Mus. XV, p. 266.
8 miles west of Pitsani, Molopo River, Bechuanaland.

4. MALACOTHRIX TYPICUS KALAHARICUS, Roberts

1932. Ann. Transv. Mus. XV, p. 10.
Kuke Pan, Central Kalahari.

5. MALACOTHRIX TYPICUS DAMARENSIS, Roberts

1932. Ann. Transv. Mus. XV, p. 10.
Gobabis, S.-W. Africa.

6. MALACOTHRIX TYPICUS EGERIA, Thomas

1926. Proc. Zool. Soc. London, p. 301.
Ondongwa, Central Ovamboland.

The "*Malacothrix albicaudatus*" of Trouessart, *albicaudatus*, Desmarest, 1820, Desm. Mamm., p. 438, is regarded by G. M. Allen as a *Mystromys* (Cricetinae).

Genus 4. PRIONOMYS, Dollman

1910. PRIONOMYS, Dollman, Ann. Mag. Nat. Hist. 8, VI, p. 226.

TYPE SPECIES.—*Prionomys batesi*, Dollman.

RANGE.—African: Cameroons.

NUMBER OF FORMS.—One.

CHARACTERS.—As remarked above, this genus may not be closely allied to *Dendromus*, *Steatomys* and *Malacothrix*. Braincase extremely heavy, rostrum relatively short; supraorbital ridges traceable. Zygomata widely spreading. Zygomatic plate narrow, but well tilted upwards. Infraorbital foramen much widened. Jugal broad, long. Incisive foramina relatively short. Palate very broad. Bullae not large. Upper incisors inclined to be pro-odont. Upper cheekteeth with cusps much raised up and thickened, of *Oenomys*-type, the rows of cusps separated from each other by deep valleys. M.1 with the cusps numerically as *Dendromus*; the whole of the inner side of the tooth is broadly curved round, on the centre of which curvature appears a strong T.4. M.2 with T.3 small, all cusps on second lamina, and third lamina evidently with only one functional cusp. M.3 at the point of becoming suppressed. Lower cheekteeth with M.3 small, but less reduced than in the upper jaw; a deep valley separates the two main rows of cusps. Mandible well ridged, with coronoid process low, far forward.

Fur soft. Tail long, poorly haired (its describer suggests the tail may be prehensile); D.5 of hindfoot long, hallux also well developed, probably opposable, though retaining a small claw; the hindfoot arboreal. Manus with D.5 shortened. Two skulls seen only.

Forms seen: *batesi*.

LIST OF NAMED FORMS

1. PRIONOMYS BATESI, Dollman
1910. Ann. Mag. Nat. Hist. 8, VI, p. 228.
Bitye, Ja River, Cameroons.

Genus 5. PETROMYSCUS, Thomas

1926. PETROMYSCUS, Thomas, Ann. Mag. Nat. Hist. 9, XVII, p. 179.

TYPE SPECIES.—*Praomys collinus*, Thomas & Hinton.

RANGE.—South-west Africa.

NUMBER OF FORMS.—Four.

CHARACTERS.—Skull with broad flattened braincase, and moderate interorbital constriction. Palate broad. Incisive foramina well open, long. Zygomatic plate more or less straight anteriorly, the infraorbital foramen not abnormal. Upper incisors compressed. M.3 much reduced in the upper series. The cheekteeth have been fully described by Hinton, Ann. Mag. Nat. Hist. 9, XVII, p. 175, 1926. He refers the genus to the Dendromyinae, and it is accordingly retained here. The molars seem to me to differ rather markedly from both Murinae and Dendromyinae. The re-entrant folds, or spaces between the laminae, appear to play a much more important part in the pattern than in any member I have seen of the other two subfamilies. The posterior lamina of M.1 and M.2 appears more or less doubled, or twisted round on itself. The lower molars are like those of *Mystromys* (Cricetinae). Indeed, as I have suggested above, it occurs to me that this genus may belong to that subfamily.

Externally with no special peculiarities; fur rather soft; small; tail moderately haired; hindfoot with D.5 lengthened, and hallux not reduced. Mammae 0—2=4 or 1—2=6. In *P. shortridgei*, either formula may be present.

Forms seen: *bruchus*, *collinus*, *monticularis*, *shortridgei*.

There does not seem to be very much difference between the named forms, except *monticularis*, which is very distinct, having much narrowed posterior nares, and shorter ears.

List of Named Forms

collinus Group

1. PETROMYSCUS COLLINUS COLLINUS, Thomas & Hinton

1925. Proc. Zool. Soc. London, p. 237.
Karibib, S.-W. Africa.

2. PETROMYSCUS COLLINUS BRUCHUS, Thomas & Hinton

1925. Proc. Zool. Soc. London, p. 238.
Great Brukaros Mountain, S.-W. Africa.

3. PETROMYSCUS SHORTRIDGEI, Thomas

1926. Proc. Zool. Soc. London, p. 302.
Cunene Falls, N.-W. Ovamboland, S.-W. Africa.

monticularis Group

4. PETROMYSCUS MONTICULARIS, Thomas & Hinton

1925. Proc. Zool. Soc. London, p. 238.
Great Brukaros Mountain, near Berseba, S.-W. Africa.

Subfamily DEOMYINAE

1888. Thomas: Muridae, Deomyes.
1896. Thomas: Muridae, Dendromyinae, part.

Geographical Distribution.—Central Africa: the Congo Basin.

Number of Genera.—One.

Characters.—Zygomatic plate abnormally narrowed, and completely beneath the infraorbital foramen (parallel—Graphiurinae). Infraorbital foramen nearly as wide as high, not narrowed below. Cheekteeth as in Dendromyinae.

Genus 1. DEOMYS, Thomas

1888. DEOMYS, Thomas, Proc. Zool. Soc. London, p. 130.

TYPE SPECIES.—*Deomys ferrugineus*, Thomas.

RANGE.—As in the subfamily Deomyinae.

NUMBER OF FORMS.—Two.

CHARACTERS.—Zygomatic plate extremely narrow, the zygomata thin, the upper and lower roots of anterior zygoma about of equal length, the zygoma commencing on a much lower level than in normal Muridae. Infraorbital foramen very large and wide. Skull with long rostrum, frontals little constricted, supraorbital ridges developed; braincase smooth and rounded. Palate broad anteriorly, narrow posteriorly; incisive foramina broad, of medium length, not reaching M.1. Bullae rather small. Incisors narrow, the upper ones with two faint grooves. Cheekteeth with M.3 minute, simple; M.1 considerably larger than M.2. M.1 with three laminae, each with two prominent and high cusps, on inner side and outer, but in the second lamina the inner one becomes central on account of the presence of a well-developed extra inner cusp, T.4. M.2 with two laminae, three cusps on the first, and two on the second. A deep depression separates the cusps of each lamina in M.1. Lower teeth with elements as in the upper series except that no third cusp is present on the second lamina of M.1, nor the front one of M.2. Cusps originally extremely high. Mandible rather weak. Fur faintly bristly. Ear large. Tail considerably longer than head and body, nearly naked on upper portion, gradually more haired as the end is approached. Forefoot not abnormal. Hindfoot narrow, lengthened, the outer digits much reduced, D.5 slightly longer than the hallux. Mammae said to be 0—2=4. Hindfoot with 5 solepads.

REMARKS.—This genus was referred to the Dendromyinae by Thomas. But the zygomatic plate suggests that the jaw-muscle structure must be very near that of *Graphiurus*, while the zygomatic plate of all other Muridae examined is tilted upwards to a greater or lesser degree, though it must be admitted that such forms as *Oxymycterus* and *Lophuromys* are sometimes not very different. However, if the Graphiurinae are to be retained as a separate subfamily, from the other Dormice (and according to Miller & Gidley they are on this account not only a different family, but even referred to a different superfamily), I think that *Deomys* must be regarded as type of a subfamily within the Muridae; it probably bears the same relationship to other Dendromyinae that *Graphiurus* does to the Muscardininae. I would add that so far as my observations go, based on nearly two hundred genera in the Muridae, the zygomatic plate and infraorbital foramen of *Deomys* appear unique.

Forms seen: *ferrugineus*, *christyi*.

LIST OF NAMED FORMS

1. DEOMYS FERRUGINEUS FERRUGINEUS, Thomas

1888. Proc. Zool. Soc. London, p. 130.
Lower Congo.

2. DEOMYS FERRUGINEUS CHRISTYI, Thomas

1915. Ann. Mag. Nat. Hist. 8, XVI, p. 150.
Poko, Uelle River, Belgian Congo.

Subfamily OTOMYINAE

1896. Thomas: Muridae, Otomyinae.
1899. Tullberg: Muridae, Otomyini.
1918. Miller & Gidley: Muridae, Otomyinae.
1924. Winge: Muridae, Murini, Mures, part.
1928. Weber: Muridae, Murinae, part.

Geographical Distribution.—Africa: widely distributed south of the Sahara; "Abyssinia to the Cape, eastwards to Lake Kivu and Angoniland; one species from Cameroons; and one specimen at British Museum from Angola" (St. Leger).

Number of Genera.—Two.

Characters.—Cheekteeth $\frac{3}{3}$, broad, hypsodont, their pattern a series of transverse plates; M.3 in the upper series the dominant tooth, always much larger than M.2; usually or always larger than M.1. Skull as in specialized Muridae. Incisors thick, typically prominently grooved. External form Rat-like, not specialized; tail usually well haired, and relatively short.

The group was revised by Thomas in 1918, before which it was held to contain two genera, *Otomys* and *Oreomys*, the latter shown by Thomas to be a synonym of *Otomys*. Thomas divided the group into three genera, *Otomys* (with subgenera *Anchotomys* and *Lamotomys*), *Myotomys*, and *Parotomys* (with subgenus *Liotomys*). *Myotomys* is not retainable as a full genus, being connected with *Otomys* by intermediate forms. The two subgenera *Anchotomys* and *Lamotomys* of Thomas seem to be nothing but aberrant species; *O. typus*, type of *Oreomys*, appears to be just as distinct as either from typical *Otomys*.

Key to the Genera of Otomyinae

Auditory bullae excessively inflated, the meatus with a strongly projecting thickened process on its anterior edge; basioccipital narrowed. Parotomys

Auditory bullae not specially inflated; basioccipital not narrowed. Otomys

Genus 1. OTOMYS, F. Cuvier

1823. Otomys, F. Cuvier, Dents des Mamm. p. 168.
1877. Oreomys, Heuglin, Reise Nordost. Afr. p. 2, p. 76. (*Oreomys typus*, Heuglin.) Name preoccupied.
1881. Oreinomys, Trouessart, Cat. Mamm. Viv. et Foss. Rodentia, in Bull. Soc. Études Sci. d'Angers, X, 2e, fasc. 111. (To replace *Oreomys*, Heuglin.)
1918. Anchotomys, Thomas, Ann. Mag. Nat. Hist. 9, II, p. 208. (*Otomys anchietae*, Bocage.)

1918. LAMOTOMYS, Thomas, Ann. Mag. Nat. Hist. 9, II, p. 208. (*Otomys laminatus*, Thomas & Schwann.)
1918. MYOTOMYS, Thomas, Ann. Mag. Nat. Hist. 9, II, p. 206. (*Otomys unisulcatus*, Cuvier & Geoffroy.)

TYPE SPECIES.—*Euryotis irroratus*, Brants.

RANGE.—Africa: Abyssinia, Kenya, Uganda, Tanganyika; Cameroons, Eastern Congo, Angola; Rhodesia, South-west Africa, Portuguese East Africa, South Africa.

NUMBER OF FORMS.—About fifty-seven.

CHARACTERS.—Skull with great interorbital constriction, very prominent supraorbital ridges, which form small postorbital knobs in front of fronto-parietal suture, and then run backwards over the parietals. Nasals typically extremely broadened anteriorly, the premaxillae not visible from above (this character not present in *unisulcatus* group). Palate very narrow, somewhat poorly ossified, and with a conspicuous raised longitudinal ridge placed centrally. Pterygoid fossae deep. Incisive foramina long, narrow, extending nearly to M.1. Bullae of medium size, not much inflated, much smaller actually and relatively than in *Parotomys*; basioccipital less narrowed than in that genus. Zygoma heavy. Infraorbital foramen and zygomatic plate of typical specialized Murine type, the zygomatic plate well cut back above. Mandible powerfully ridged, the angular portion slightly turned outwards at the back, giving a somewhat Hystricoid appearance from outer side. Upper incisors with one deep groove placed externally, or with one deep outer and one shallow inner groove. In some specimens of *unisulcatus* group, the grooving obsolete. Lower incisors with one deep groove placed externally, and one shallow inner groove, or with two clear grooves, or in *unisulcatus* group grooving obsolete or absent. Cheekteeth a series of straight transverse plates; in the upper series, M.1 has always three laminae, M.2 has two, and M.3 may have nine, eight, seven, six, five or four. Lower cheekteeth: M.2 and M.3 have two laminae (M.3 is not enlarged); M.1 has four, except in *anchietae* (five), and *laminatus* (seven). In one specimen of *tropicalis* seen, however, there are five, which indicates that subgeneric names based on number of laminae alone will not be retainable if a great number of specimens are at hand. The laminae are tightly packed together; M.3 upper is always considerably enlarged, in some cases excessively so.

"*Myotomys*" was proposed as a full genus by Thomas, with the characters: "Skull with more indication of an approach to *Otomys*. But the muzzle is not modified in the peculiar way characteristic of that genus, the nasals being little broadened anteriorly . . . the interorbital region not specially contracted, its edges with distinct beads, which evenly diverge backwards instead of abruptly curving out to form postorbital projections as in the case of *Otomys*. These beads scarcely run any distance on to the parietals. Other skull characters much as in *Otomys*. . . . One species, *M. turneri*, both has more expanded nasals than in normal, and has clearly five laminae in its M.3; but even then there is no equality with the specialized condition found in true *Otomys*, and the frontal ridges are quite as in *Parotomys*, not as in *Otomys*." The tendency to grooving of incisors and lamination of molars is less in "*Myotomys*" than in true *Otomys*. But *O. turneri* seems to be very near *Otomys* s.s. as regards nasal broadening, and to be intermediate between *Otomys* and *Myotomys* both in this character and in the character of the five laminae of M.3, in which it agrees with the aberrant species *O. denti* (an *Otomys* s.s.). There therefore remains only the shape of the parietal and frontal ridges, which is certainly not a valid generic character (compare, for instance, the various formations found within the genus *Rattus*).

Another intermediate between the two groups is *karoensis*, Roberts (not seen), described as with the general colour and cranial characters of *Myotomys* but the dentition of an *Otomys*: "it is a distinct link between the two genera, thus reducing *Myotomys* to subgeneric rank." As, however, this species is intermediate between *Otomys* and "*Myotomys*" in dental characters, and *turneri* is intermediate between the two groups in cranial characters, I can see no reason for regarding "*Myotomys*" as anything but a synonym of *Otomys*.

External characters: form rather thickset; fur moderate, or in some forms becoming thick and soft (*unisulcatus* group chiefly); tail shorter than head and body, well haired; feet not peculiar; outer digits of hindfoot rather reduced, though not excessively so; mammae 4, inguinal (Shortridge).

Forms seen: *anchietae*, *angoniensis*, *auratus*, *broomi*, *burtoni*, *coenosus*, *canescens*, *cupreus*, *dartmouthi*, *degeni*, *denti*, *elassodon*, *elgonis*, *fortior*, *granti*, *irroratus*, *jacksoni*, *kempi*, *laminatus*, *mashona*, *maximus*, *malleus*, *nyikae*, *nubilus*, *orestes*, *percivali*, *rowleyi*, *rubeculus*, *sloggetti*, *squalus*, *turneri*, *tropicalis*, *thomasi*, *unisulcatus*, *vivax*.

For a review of species see Wroughton, Ann. Mag. Nat. Hist. 7, XVIII, p. 264, 1906, and Dollman (East African forms), Ann. Mag. Nat. Hist. 8, XV, p. 149, 1915.

The genus appears to divide, broadly speaking, into about six groups, as follows:

laminatus group: M.3 with 9 or 10 laminae, M.1 lower with 7 laminae; lower incisors with one deep outer, one shallow inner groove.

O. laminatus: South Africa.

anchietae group: M.3 with 7 laminae, as in many others, but M.1 lower with 5 laminae.

O. anchietae: Angola and Tanganyika.

typus group: Based on those forms with the lower incisors having two deep grooves. As in all remaining species, M.1 lower has 4 laminae.

O. typus, Abyssinia: with M.3 with 8 laminae (the nearest approach to *laminatus* known in the genus); or even with a rudimentary ninth.

O. jacksoni, Kenya, Abyssinia: M.3 with 7 laminae; also *O. percivali*, from Kenya.

And *O. dartmouthi*, from Uganda: M.3 with 6 laminae.

irroratus group: This contains the majority of the genus. The lower incisors have one deep outer and one shallow inner groove, usually.

M.3 with 7 laminae: *O. angoniensis*, *O. nyikae*, *O. tropicalis*, *O. rubeculus*, *O. divinorum*, *O. thomasi*, East Africa (Kenya, Uganda, East Congo); *O. burtoni*, Cameroons; *O. rowleyi*, Portuguese East Africa.

M.3 with 6 laminae: *O. orestes*, Kenya; *O. irroratus*, Southern Africa; *O. kempi*, Congo: this form has one groove to lower incisors, and appears to be nearly allied to *denti* (below).

M.3 with 5 laminae: *O. denti*, from Ruwenzori; a very dark species.

turneri group: *O. turneri*, presenting cranial characters which are intermediate between those above and the *unisulcatus* group. M.3 with 5 laminae. Orange River Colony.

unisulcatus group: *O. sloggetti*, and *O. unisulcatus*, with their races; M.3 with 4 laminae (sometimes the third and fourth are partly joined, and not complete); lower incisors usually plain; upper incisors may become so. South Africa.

O. karoensis, not seen, probably also represents a group, as noted above.

List of Named Forms

(References and type localities of all Otomyinae by Mr. G. W. C. Holt.)

laminatus Group

1. OTOMYS LAMINATUS LAMINATUS, Thomas & Schwann

1905. Abstr. Proc. Zool. Soc. London, p. 23; Proc. Zool. Soc. London, p. 267.
Subudeni, Zululand, S. Africa.

2. OTOMYS LAMINATUS PONDOENSIS, Roberts

1924. Ann. Transv. Mus. X, p. 71.
Pondoland, S. Africa.

3. OTOMYS LAMINATUS MARIEPSI, Roberts

1929. Ann. Transv. Mus. XIII, p. 110.
Lydenburg, Transvaal, S. Africa.

anchietae Group

4. OTOMYS ANCHIETAE ANCHIETAE, Bocage

1882. Journ. Sc. Acad. Lisbon, IX, p. 26.
Caconda, Angola.

5. OTOMYS ANCHIETAE LACUSTRIS, G. M. Allen & Loveridge

1933. Bull. Mus. Comp. Zool. Harvard Coll. LXXV, 2, p. 120.
Madehani, north end of Lake Nyasa, Tanganyika.

typus Group

6. OTOMYS TYPUS TYPUS, Heuglin

1877. Reise N. Ost. Afr. ii, p. 77.
Shoa, Abyssinia.
Synonym: *degeni*, Thomas, 1902, Proc. Zool. Soc. London, p. 311.
Gombitchu, Shoa.

7. OTOMYS TYPUS FORTIOR, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 302.
Charada, Kaffa, Abyssinia.
(Considered a distinct species by Dollman.)

8. OTOMYS JACKSONI JACKSONI, Thomas
1891. Ann. Mag. Nat. Hist. 6, VII, p. 2.
Mt. Elgon, Uganda side.

9. OTOMYS JACKSONI HELLERI, Frick
1914. Ann. Carnegie Mus. IX, nos. 1–2, p. 10.
Chilalo Divide, Abyssinia.

10. OTOMYS JACKSONI MALKENSIS, Frick
1914. Ann. Carnegie Mus. IX, nos. 1–2, p. 11.
Malka, Sidamo, Abyssinia.

11. OTOMYS PERCIVALI, Dollman
1915. Ann. Mag. Nat. Hist. 8, XV, p. 168.
12 miles south of Lake Olballassat, Naivasha district, Kenya.

12. OTOMYS DARTMOUTHI, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 141.
E. Ruwenzori, Uganda.

irroratus Group

13. OTOMYS ANGONIENSIS ANGONIENSIS, Wroughton
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 274.
M'Kombhuie, Nyasaland.

14. OTOMYS ANGONIENSIS ELASSODON, Osgood
1910. Field Mus. Nat. Hist. Zool. ser. X, 2, p. 10.
Naivasha, Kenya.

15. OTOMYS NYIKAE NYIKAE, Wroughton
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 276.
Nyika Plateau, Nyasaland.

16. OTOMYS NYIKAE CANESCENS, Osgood
1910. Field Mus. Nat. Hist. Zool. ser. X, 2, p. 10.
Kijabe, Kenya.

17. OTOMYS TROPICALIS TROPICALIS, Thomas
1902. Ann. Mag. Nat. Hist. 7, X, p. 314.
West slope of Mt. Kenya.

18. OTOMYS TROPICALIS ELGONIS, Wroughton
1910. Ann. Mag. Nat. Hist. 8, V, p. 207.
Elgonyi, Elgon, Kenya.

19. OTOMYS TROPICALIS VIVAX, Dollman
1915. Ann. Mag. Nat. Hist. 8, XV, p. 159.
Mt. Nyiro, south of Lake Rudolf, Kenya.

20. OTOMYS TROPICALIS NUBILIS, Dollman
1915. Ann. Mag. Nat. Hist. 8, XV, p. 160.
Jombeni, Igembi Range, north-east of Mt. Kenya.

21. OTOMYS TROPICALIS GHIGII, de Beaux
1924. Ann. Mus. Civ. Stor. Nat. Genova, 51, p. 213.
Bugala, Uganda.

22. OTOMYS TROPICALIS VULCANICUS, Lonnberg & Gyldenstolpe
1925. Arkiv. f. Zool. Band 17B, no. 5, p. 2.
Mt. Sabinio, Birunga Volcanoes, E. Congo.

23. OTOMYS TROPICALIS FARADJIUS, Hatt
1934. Amer. Mus. Nov. 708, p. 1.
Faradje, Upper Uele district, E. Congo.

24. OTOMYS RUBECULUS, Dollman
1915. Ann. Mag. Nat. Hist. 8, XV, p. 161.
Kagambah, Uganda.

25. OTOMYS DIVINORUM, Thomas
1910. Ann. Mag. Nat. Hist. 8, VI, p. 311.
Rombo, Mt. Kilimanjaro, Tanganyika.

26. OTOMYS THOMASI THOMASI, Osgood
1910. Field Mus. Nat. Hist. Zool. ser. X, 2, p. 9.
Molo, Kenya.

27. OTOMYS THOMASI MALLEUS, Dollman
1915. Ann. Mag. Nat. Hist. 8, XV, p. 154.
Lake Olbollossat, Naivasha Province, Kenya.

28. OTOMYS THOMASI SQUALUS, Dollman
1915. Ann. Mag. Nat. Hist. 8, XV, p. 155.
Mt. Kinangop, Aberdare Range, Kenya.

29. OTOMYS BURTONI, Thomas
1918. Ann. Mag. Nat. Hist. 9, II, p. 210.
Cameroon Mountain.

30. OTOMYS ROWLEYI, Thomas
1918. Ann. Mag. Nat. Hist. 9, II, p. 209.
Coguna, Inhambane, Portuguese E. Africa.

31. OTOMYS MASHONA, Thomas
1918. Ann. Mag. Nat. Hist. 9, II, p. 210.
Mazoe, Mashonaland, S. Rhodesia.

32. OTOMYS ORESTES ORESTES, Thomas
1900. Proc. Zool. Soc. London, p. 175.
Teleki Valley, Mt. Kenya.

33. OTOMYS ORESTES DOLLMANI, Heller
1912. Smiths. Misc. Coll. LIX, 16, p. 5.
Mt. Gargues, Matthews Range, Kenya.

34. OTOMYS IRRORATUS IRRORATUS, Brants
1827. Geslacht der Muizen, p. 94.
Uitenhage, Cape of Good Hope.
Synonym: *bisulcatus*, Cuvier & Geoffroy, 1829, Hist. Nat. Mamm. IV, p. 71.
obscura, Lichtenstein, 1842, Säug. Caffern. p. 10.
typicus, Smith, 1834, South Afr. Quart. Journ. 2, p. 149.

35. OTOMYS IRRORATUS AURATUS, Wroughton
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 272.
Vredefort, Orange Free State.

36. OTOMYS IRRORATUS CUPREUS, Wroughton
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 273.
Zoutspansberg, Transvaal.

37. OTOMYS IRRORATUS MAXIMUS, Roberts

1924. Ann. Transv. Mus. X, p. 70.
Machili River, N.-W. Rhodesia.

38. OTOMYS IRRORATUS COENOSUS, Thomas

1918. Ann. Mag. Nat. Hist. 9, II, p. 208.
Kuruman, Bechuanaland.

39. OTOMYS IRRORATUS NATALENSIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 111.
Bilgobbin, Dargle district, Natal.

40. OTOMYS IRRORATUS RANDENSIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 112.
Fontaine Bleau, Johannesburg.

41. OTOMYS KEMPI, Dollman

1915. Ann. Mag. Nat. Hist. 8, XV, p. 152.
Burunga, Mt. Mikeno, Belgian Congo.

42. OTOMYS DENTI, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 142.
E. Ruwenzori, Uganda.

Not seen, and not allocated to Group

43. OTOMYS KAROENSIS, Roberts

1931. Ann. Transv. Mus. XIV, p. 231.
Wolseley, Cape Province.
(For note on the characters and probable position of this species see above.)

44. OTOMYS SILBERBAUERI, Roberts

1919. Ann. Transv. Mus. VI, p. 114.
Lormarins, Paarl district, S. Africa.

45. OTOMYS ROBERTSI, Hewitt

1927. Rec. Albany Mus. 3, p. 430.
Mont-aux-Sources, Orange Free State-Basutoland border.

46. OTOMYS TUGELENSIS TUGELENSIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 113.
Klipspruit, Utrecht, Natal.

47. OTOMYS TUGELENSIS SABIENSIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 114.
Mariepskop, Lydenburg district, Transvaal.

48. OTOMYS TUGELENSIS PRETORIAE, Roberts

1929. Ann. Transv. Mus. XIII, p. 114.
Fountains Valley, Pretoria.

49. OTOMYS TUGELENSIS SAUNDERSIAE, Roberts

1929. Ann. Transv. Mus. XIII, p. 115.
Grahamstown, S. Africa.

turneri Group

50. OTOMYS TURNERI, Wroughton

1907. Ann. Mag. Nat. Hist. 7, XX, p. 31.
Aberfeldy, N.-E. Orange River Colony.

unisulcatus Group

51. OTOMYS SLOGGETTI SLOGGETTI, Thomas

1902. Ann. Mag. Nat. Hist. 7, X, p. 311.
Deelfontein, S. Africa.

52. OTOMYS SLOGGETTI JEPPEI, Roberts

1929. Ann. Transv. Mus. XIII, p. 109.
Jamestown, Cape Province.

53. OTOMYS SLOGGETTI BASUTICUS, Roberts

1929. Ann. Transv. Mus. XIII, p. 110.
Bolepeletsa, Basutoland, S. Africa.

54. OTOMYS UNISULCATUS UNISULCATUS, Cuvier & Geoffroy

1829. Mamm. livr. LX, fig. 264.
Cape of Good Hope.

55. OTOMYS UNISULCATUS BERGENSIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 108.
Lambert's Bay, S. Africa.

56. OTOMYS UNISULCATUS GRANTI, Thomas

1902. Ann. Mag. Nat. Hist. 7, X, p. 312.
Fish River, Deelfontein, S. Africa.

57. OTOMYS UNISULCATUS BROOMI, Thomas

1902. Ann. Mag. Nat. Hist. 7, X, p. 313.
Port Nolloth, Little Namaqualand.

Genus 2. PAROTOMYS, Thomas

1918. PAROTOMYS, Thomas, Ann. Mag. Nat. Hist. 9, II, p. 205.
1918. LIOTOMYS, Thomas, Ann. Mag. Nat. Hist. 9, II, p. 205. (*Parotomys littledalei*, Thomas.) Valid as a subgenus.

TYPE SPECIES.—*Otomys brantsii*, Smith.

RANGE.—South Africa, extending to South-west Africa.

NUMBER OF FORMS.—Six.

CHARACTERS.—Bullae extremely large and inflated, the meatus with strongly projected thickened anterior process, visible from above. Basioccipital region narrowed. Other essential cranial characters as *Otomys*; but the interorbital constriction not extreme, the nasals little broadened anteriorly. Cheekteeth: upper series with three laminae in M.1, two in M.2, and two complete laminae in M.3, this tooth also with a long backwardly pointing heel, in which two laminal elements occur; occasionally there are four complete laminae in this tooth. Lower molars: M.2 and M.3 with two laminae, as usual; M.1 with four, the two anterior ones not clearly separated from each other. Lower incisors plain. Upper incisors typically with one deep outer, one shallow inner groove. External characters not essentially different from *Otomys*; fur soft; in subgenus *Liotomys*, the tail is apparently less reduced than is usual. Mammae 4.

LIOTOMYS was proposed as a subgenus for the species *littledalei*, in which the upper incisors are plain.

This genus seems clearly distinct from *Otomys*, on account of the much-inflated bullae.

Forms seen: *brantsii*, *littledalei*, *luteolus*.

List of Named Forms

Subgenus *Parotomys*, Thomas

1. PAROTOMYS BRANTSII BRANTSII, Smith

1833. South Afr. Quart. Journ. ii, p. 150.
Namaqualand, S. Africa.
Synonym: *pallida*, Wagner, 1841, Arch. Naturg. 1, p. 134. S. Africa.
rufifrons, Wagner, 1843, Schreber Säug. Suppl. iii, p. 507.

2. PAROTOMYS BRANTSII LUTEOLUS, Thomas & Schwann

1904. Proc. Zool. Soc. London, p. 178.
Deelfontein, Cape Colony.

3. PAROTOMYS BRANTSII DESERTI, Roberts

1933. Ann. Transv. Mus. XV, p. 267.
Bushman Pits, Kuruman, Bechuanaland.

Subgenus *Liotomys*, Thomas

4. PAROTOMYS LITTLEDALEI LITTLEDALEI, Thomas

1918. Ann. Mag. Nat. Hist. 9, II, p. 205.
Tuin, Kenhart, W. Cape Province.

5. PAROTOMYS LITTLEDALEI MOLOPENSIS, Roberts

1933. Ann. Transv. Mus. XV, p. 267.
Hakscheen Pan, west of Molopo River, S. Africa.

6. PAROTOMYS LITTLEDALEI NAMIBENSIS, Roberts

1933. Ann. Transv. Mus. XV, p. 268.
Swakopmund, S.-W. Africa.

The Otomyinae form an interesting and apparently rather isolated branch of Muridae, considerably more distinct from Murinae I think than are Hydromyinae, Rhynchomyinae, Dendromyinae and Deomyinae. In the young teeth, cutting, as in a specimen of "*Myotomys*," there do not appear to be traces of cusps. No other Muridae with rooted cheekteeth possess the peculiarity that M.3 is considerably larger than M.1 or M.2, though this may occur in some Microtinae. The Otomyinae parallel the Microtinae in the fact that the teeth which are most subject to change of form are M.3 upper and M.1 lower. So far as I am aware, little or nothing is known of their fossil history, and they have not been discovered outside Africa.

Subfamily CRICETINAE

1896. Thomas: Muridae, Sigmodontinae (included Palaearctic genera and all genera from Madagascar); Neotominae.

1899. Tullberg: Cricetidae. Hesperomyidae. Nesomyidae, part.

1918. Miller & Gidley: Cricetidae, part, Cricetinae (included all genera from Madagascar).
1924. Winge: Muridae; Rhizomyini, part (genera from Madagascar). Cricetini, part, groups; Criceti (included *Lophiomys* and *Siphneus* = *Myospalax*); Hesperomyes.
1928. Weber: Nesomyidae, part. Muridae, Cricetinae.

Geographical Distribution.—Entire American Continent from Arctic Canada and Alaska south to Southern Patagonia; the greater part of the Palaearctic region (North France, Hungary, Greece, Asia Minor, Syria, Persia, Kashmir eastwards to east coast of Northern China, north to Germany, temperate Russia and temperate Siberia); Southern Africa; Madagascar.

Number of Genera.—Fifty-four groups worthy of generic rank are represented in the British Museum. Eight named genera, of which at least three are valid, are not represented in London.

Characters.—Cheekteeth cuspidate, laminate or prismatic; rooted; when cuspidate, the cusps arranged in two longitudinal rows in both upper and lower molars; the laminae bearing the cusps separated by wide re-entrant folds (compare Murinae, and allied subfamilies); cheekteeth not a series of transverse plates combined with tendency to enlargement of M.3 (compare Otomyinae); cheekteeth without pattern of thick isolated enamel ridges extending across crown surface (compare Tachyoryctinae); when teeth are prismatic, roots developed in adult, and skull not becoming much modified by ridges for jaw-muscle attachment, not developing squamosal crest in any genus examined, nor median interorbital crest, etc. (compare Myospalacinae, Microtinae); skull not taking on "saltatorial" appearance, with enlarged braincase and bullae, and weakened rostrum, etc. (compare Gerbillinae). In some genera the cheekteeth become flatcrowned and have alternating inner and outer re-entrant folds, something after the manner of some Hystricoid genera.

Skull and external form various; as a rule not extremely specialized; in rare cases (*Notiomys, Chelemyscus, Blarinomys*) considerably modified for fossorial life; or in *Ichthyomys* and allied genera much specialized for aquatic life.

The present group is the most difficult group of living Rodents to arrange in any natural order. They are on the whole very generalized, being scarcely more progressive dentally than the primitive Murinae; according to Hinton in this group the centre row of cusps of the upper molars of the ancestral Murine has become suppressed, leaving two rows only; they further differ from Murinae in the clear spaces between the laminae.

Over seventy groups have been given generic names in the past, very many of them on extremely vague characters which can be duplicated elsewhere more or less at any time.

This subfamily, except the Palaearctic members, have had less attention paid to them by the present author than any other group of Rodents. The North American genera which have large ranges have been properly revised by American authors. But directly Panama is passed, an enormous list of names described for the most part binomially, and in appalling chaos, is reached. I am quite convinced that to get this list in order is far beyond the scope of a book of this nature, and in the majority of the South American genera, I have listed all forms described binomially alphabetically. It may be noted that in America there are just about a thousand named forms belonging to this subfamily.

An important work by Gyldenstolpe, Kungl. Svenska. Vetens. Akad. Handl. Stockholm, 3, Band 11, no. 3, 1932, lists all named forms south of Panama and gives short notes on their characters. Although no revision has been attempted, this work will be extremely useful to authors who attempt to revise any genus occurring south of Panama, as it has collected together data on all these forms. But even here, the generic characters listed are exceedingly vague.

Cranial characters are of no use in dealing with a group of this description from the point of view of arranging a key, as all being more or less generalized Muridae, there are no characters (with very few exceptions) which will not be duplicated in any of the large genera. External characters are very much the same; even the tail reduction, which might on first view be used to divide off such genera as *Cricetus* and *Onychomys*, is overlapped by short-tailed species of many of the Neotropical genera. One is forced therefore to endeavour to divide the genera on dental characters, and a key has been got together which is in many places much more average than absolute, and probably can be broken down; this is chiefly owing to the fact that although such forms as *Neotoma*, *Sigmodon* and *Oryzomys*, representing three extremes, are very widely separated dentally, there are a host of subsidiary genera which have intergrading dental characters; in fact some genera start life in one section, and in the adult appear to develop a dental pattern not distinguishable from that of another section. All American Cricetinae seem to be extremely closely allied, and to have no characters which will constantly separate them from allied genera, in very many instances; even long-standing and well-known genera like *Akodon*, *Peromyscus*, *Oryzomys*, *Phyllotis* and *Hesperomys* are not in all cases clearly distinguishable, and as each of these may have as many as a dozen closely allied subsidiary genera, the task of arranging these in any natural order is almost impossible. The South American genera are all so essentially similar perhaps because they have probably been isolated there for millions of years and have had no competition with other subfamilies of Muridae (as Murinae, Microtinae, Gerbillinae, etc.), as have the genera of any of these subfamilies in other portions of the world, such as the Palaearctic or Africa. Very much the same essential similarity and intergrading or overlapping of characters occurs in the Indo-Malayan region in the Murinae (*Rattus*, etc.), in which these are almost the sole type of Muridae.

Characters have been used in this subfamily for generic purposes which one would take no notice of elsewhere, but which must be used if even long-standing genera like, for instance, *Rhipidomys* are retained.

ORYZOMYS seems to be fundamentally the most primitive genus if complexity of cheekteeth indicate a primitive character, as has been held by Hinton, and in the present work. The molars are brachyodont, cusped, and extremely complex, and have well-marked subsidiary ridges in the main outer folds. The genus contains nearly two hundred named forms ranging from the southern

United States to Patagonia, and round it centre many named genera, some of which are retainable, and some of which are not. RHIPIDOMYS and THOMASOMYS are among the less differentiated of these. NECTOMYS seems to be more progressive dentally, in a tendency to lose the cusps, and for the outer folds of the upper molars to isolate as enamel islands on the crown surface; but *Oryzomys* approaches this type of dentition, in certain sections. All these Rats are generalized in cranial and external characters, or in *Rhipidomys* and sometimes *Thomasomys*, and some sections of *Oryzomys*, are becoming a little specialized for arboreal life (not more so than in some sections of *Rattus* among the Murinae). OTOTYLOMYS, TYLOMYS, and NYCTOMYS combine certain arboreal specialization with a broadened "Squirrel-formed" skull like that which is found in progressive species of *Pogonomys* (Murinae), and other Indo-Malayan genera. The teeth of these three genera all differ in detail from *Oryzomys*. The Madagascar genus NESOMYS seems to represent a stage of dental development not very much more progressive than *Oryzomys*.

RHAGOMYS is a very little-known genus which appears in the very few specimens available for examination to combine a more simplified and progressive dentition than *Oryzomys*, with a more specialized arboreal hindfoot than any of the above-mentioned arboreal genera, but as the skins seen are not in good condition the last statement cannot be guaranteed.

REITHRODONTOMYS contains a group of small Mice ranging from Ecuador north to the warmer portions of the United States, the generic character of which lies in the grooved incisors. A section of the genus has *Oryzomys*-like teeth, while another section has more simplified molars, in which the subsidiary ridges are suppressed. The genus has been fully revised by Howell, and according to this author the two types of dentition are connected by intermediate forms.

PEROMYSCUS is the dominant genus of North American Cricetine-Rat, ranging from Labrador and Alaska to Panama. It appears to stand near *Oryzomys*, from which it differs in dental details such as the fusion of the anterior pair of cusps, and the fact that the cusps of the upper molars are less opposite to each other. In one section of the genus, the subsidiary ridges of the upper molars tend to become suppressed. The genus is revised by Osgood, and contains over a hundred and seventy named forms. BAIOMYS was regarded as a subgenus of *Peromyscus* by Osgood, but is now given generic rank; it contains a few small Mice from Texas and Mexico, and appears to me to be distinct from *Peromyscus*; in fact it might represent one of the genera of small South American Rats, such as *Hesperomys*. The subsidiary ridges of the upper molars are not apparent in any specimen examined; but the cusps are well marked, and the molars do not show tendency to become prismatic or more flatcrowned. CALOMYSCUS from Persia, Baluchistan, and Turkmenia, is I think very closely allied to *Peromyscus*, but is more simplified dentally, and has a more robust zygoma. ONYCHOMYS from the United States, Mexico and Southern Canada parallels the Old World Hamsters in external characters to a certain extent, but is I think quite distinct from them, and from all other North American genera in dental details; the cusps of the molars in those seen (not very many it must be admitted) are more raised up and prominent than in any other genus, and there are no subsidiary ridges in the main outer folds.

AKODON (including about eight subsidiary "genera" of Thomas) appears to stand very near *Oryzomys*, but there is tendency for simplification of the molars, which are usually narrower, with weaker re-entrant folds, and with a tendency to become more hypsodont; in many cases in this genus the subsidiary ridges are present in the main outer folds in the young specimen, but seem to become lost with wear. M.3 is more reduced than is normal in *Oryzomys*-like genera (but agreeing in this character with *Peromyscus*). The genus contains a large number of named forms from South America. OXYMYCTERUS and LENOXUS stand near *Akodon*, but are more specialized, or aberrant; the skull takes on a superficial resemblance to the African Murine *Lophuromys* in some characters, such as very low and weak zygomatic plate, and tendency towards unusually wide unconstricted frontals. The rostrum is usually long and pointed. The former is rather specialized for fossorial habits. BLARINOMYS is a small Mouse, like *Oxymycterus* in cranial characters, but much more specialized for underground life. NOTIOMYS, containing several species from southern South America, is also much specialized for digging, the claws being immensely enlarged, as happens elsewhere in such genera as *Prometheomys*, *Myospalax*, etc. The genus is probably a near ally or offshoot of *Akodon*.

SCAPTEROMYS is an isolated genus which may be allied to *Akodon*, or may be derived from *Oryzomys*. The subsidiary ridges in the main outer folds of the molars are apparently clearly traceable, but the general pattern is much more progressive than in the complex-toothed types, the folds of the molars isolating on crown surface with wear something after the manner of *Spalax*, or genera with a similar dentition, though more complex than in *Spalax*. The external form is slightly specialized for aquatic and for fossorial habits; the size may become large.

SCOTINOMYS appears to be a remarkably isolated type, judging by very few skulls examined; the folds of the upper molars are completely isolated as deep central pits between the cusps in old specimens; the general dentition is weak, with narrow teeth, and obsolete re-entrant folds. I have no notes on the pattern of moderately young specimens, however.

The Palaearctic Hamsters seem to me to be quite clearly distinguishable from other genera on dental characters, in the importance of the deep isolated pits between the cusps in the upper molars, combined with general complexity of dental arrangement (with wide heavy re-entrant folds, six well-marked cusps in M.1, no reduction normally of M.3, etc.), combined with suppression of the subsidiary ridges in the main outer folds. The external form, as is well known, is as a rule rather highly specialized, with tendency to general thickset form, shortening of feet, reduction of tail, etc. CRICETULUS has the widest range, the largest number of groups of species, and is the most generalized in cranial characters; PHODOPUS is distinguished from it by the specialized characters of the feet; CRICETUS and MESOCRICETUS have a much more specialized heavily ridged skull than in these genera, and the external characters typical of the section are at their maximum development in these two genera.

The African MYSTROMYS may be allied to the *Cricetus* series or it may be allied to the Neotropical *Phyllotis* series; it has remarkably few diagnostic characters as a genus. In the young the cusps of the molars are well developed. The general dental pattern is simpler than in the *Cricetus* section, and the *Oryzomys* genera. The form is more or less Cricetine, with a considerably shortened tail (in all seen).

HESPEROMYS contains a group of generalized and rather nondescript small Mice from South America. The cusps of the molars are still apparent, but it differs from *Oryzomys* and *Akodon* in the complete suppression of subsidiary ridges in the main folds of the upper molars. It seems to lead straight into ELIGMODONTIA and PHYLLOTIS, the latter containing many species; in both these genera there is a tendency for loss of cusps, and for the molars to take on a more or less weakly prismatic appearance, or to become nearly a series of transverse plates (which when present are separated by clear inner and outer folds). This section of genera seems to me to lead straight into the specialized hypsodont prismatic *Neotoma* type of dentition on the one hand, and probably to the more brachyodont less Microtine type of *Reithrodon*, *Holochilus* and *Sigmodon* on the other.

CHINCHILLULA is more hypsodont than *Phyllotis*, and more with a tendency for a flatcrowned laminate type of dentition from birth. IRENOMYS, a little-known form, has as highly specialized a dentition as is known in the subfamily, the molars, cutting and adult, being completely simplified transverse plates separated by equal-sized rather wide inner and outer re-entrant folds, much as in the Gerbil *Meriones*. ANDINOMYS is a hypsodont prismatic type, from South America, which seems to be very near the *Neotoma* series. NEOTOMA, with many species and groups from Western Canada, the United States, and Mexico, has hypsodont prismatic Vole-like molars. The genus contains large Rats. The skull, compared with Microtinae, is much less specialized by jaw-muscle ridges. The teeth are rooted, and the pattern ultimately becomes obliterated. HODOMYS and NELSONIA, the latter rather modified dentally, are allied types.

Several genera have a type of dentition which while prismatic and flat-crowned differs rather markedly from the Neotomine type, chiefly perhaps in the more brachyodont teeth, and the very narrow alternating folds, which are scarcely open at all; the general effect being reminiscent of a type of dentition found in some Hystricoid genera.

NEOTOMYS, rather an isolated type, with specialized skull and complex M.3, REITHRODON, with a highly specialized skull and simple reduced M.3, EUNEOMYS, with less specialized skull, and CHELEMYSCUS, near the last but with enormously enlarged foreclaws, are South American types all of which possess grooved incisors, and all of which belong in this section, as do HOLOCHILUS, which has a complex M.3, and SIGMODON, with several forms from the southern United States, Central and northern South America.

HYPOGEOMYS, from Madagascar, is a highly specialized Giant Rat with (in the one specimen seen) hypsodont, prismatic teeth with inner and outer re-entrant folds, and with several external specializations.

The South American Fishing-rats, ICHTHYOMYS, RHEOMYS and ANOTOMYS, are so specialized cranially and externally for aquatic life that they need no special comparison with the other genera.

I am handicapped in these notes in several cases by the lack of material in some of the lesser-known genera, so that if and when more of these come to hand it may be that some of the characters given will be found to be not constant.

(The references and type localities for all members of the subfamily Cricetinae listed below are the work of Mr. G. W. C. Holt.)

Key to the Genera of Cricetinae

(not including *Xenomys*, *Teanopus*, *Otonyctomys* and a few others not represented in the British Museum)

External form highly modified for aquatic life. Skull much specialized towards aquatic life (with much flattened braincase, enlarged infraorbital foramen, narrowed zygomatic plate, etc., its general appearance *Hydromys*-like).

Nasals slanting upwards anteriorly, the nasal opening much heightened. Lower incisors extremely compressed, but the upper pair less so. No earconch. 1. Anotomys

Nasals not slanting upwards anteriorly, the nasal opening not specially heightened. A functional earconch present.

Upper and lower incisors broad. 2. Ichthyomys

Upper and lower incisors narrow. 3. Rheomys

External form never extremely modified for aquatic life. Skull without the above-mentioned peculiarities.

External form much modified for fossorial life (either by strong reduction of ears and eyes, or by great enlargement of foreclaws).

Claws not lengthened. Infraorbital foramen unusually large. 4. Blarinomys

Claws greatly lengthened. Infraorbital foramen moderate.

Posterior portion of palate with deep pits each side; upper incisors grooved. 5. Chelemyscus

Posterior portion of palate not abnormal. Upper incisors plain. 6. Notiomys

External form never excessively modified for fossorial life.

Zygomatic plate much narrowed, usually slanting gradually backwards from lower to upper border, the lower border always considerably in front of upper border; infraorbital foramen usually large, well open. (Skull normally with little interorbital constriction, lengthened rostrum, heavy braincase.)

The foreclaws prominent and considerably lengthened. 7. OXYMYCTERUS

The foreclaws normal.

Nasals extending posteriorly beyond front portion of orbit; interparietal large; interorbital constriction scarcely apparent. 8. LENOXUS

Nasals not extending posteriorly beyond front portion of orbit; interparietal small, much reduced; interorbital constriction more marked. 9. MICROXUS

Zygomatic plate not or less narrowed, and tilted more strongly upwards (in genera in which it is narrowed, it is always tilted upwards). (Skull usually without the above-mentioned peculiarities.)

Upper cheekteeth specialized, their normal cuspidate pattern not apparent at any time, and obliterated (in the majority of genera included in this section, cutting teeth have been examined; *Neotomodon* may be an exception to the above statement); the pattern of the molars prismatic and flatcrowned. (Genera Numbers 10–23.)

The laminae of the upper molars plain, straight, and equal-sized, these separated by inner and outer folds which are opposite to each other, about equal in depth, and almost meeting in middle line of the teeth. 10. IRENOMYS

The laminae of the upper molars never as just described, the inner and outer folds alternating, the general effect less simple.

Third upper molar simplified, without inner folds. 11. NELSONIA

Third upper molar always with inner fold present.

Upper incisors clearly grooved.

Third upper molar enlarged, complex; groove of upper incisors placed at outer side of tooth; nasals abnormally expanded anteriorly. (Palate with deep pits in posterior portion). 12. NEOTOMYS

Third upper molar not complex nor enlarged; groove of upper incisors placed more centrally; nasals not abnormally expanded anteriorly.

Zygoma robust; pits in posterior portion of palate shallow. 13. SIGMOMYS

Zygoma slender; pits in posterior portion of palate deep.

Zygomatic plate with strongly marked forwardly projecting process on upper border; M.2 not S-shaped. 14. REITHRODON

Zygomatic plate without forwardly projecting process on upper border; M.2 S-shaped. 15. EUNEOMYS

Upper incisors plain.

Zygoma very heavy, chiefly formed by the jugal, which is relatively long. (Bullae enlarged, paroccipital process lengthened; ear enlarged, plantar pads reduced; apparently giant form; only one specimen available for examination.) 16. HYPOGEOMYS

Zygoma slender, or less heavy; in forms with a thicker zygoma (*Sigmodon*, *Holochilus*) the jugal is excessively reduced.

The folds of the upper molars in moderately young adult animals are widely open, the general dental pattern is in appearance reminiscent of that of Microtinae.

Palate extending posteriorly to end of toothrows or slightly behind that level.

Zygomatic plate with anterior border concave, and sharply cut back above. (Folds of upper molars alternating; first lower molar exceptionally complex originally, compare *Chinchillula*.) 17. ANDINOMYS

Zygomatic plate with anterior border straight.

Braincase broad; rostrum broad; two well-marked inner folds in M.1. (Folds of upper molars nearly opposite; first lower molar not exceptionally complex, compare *Andinomys*.) 18. CHINCHILLULA

Braincase narrow; rostrum narrow; one well-marked inner fold in M.1. (The position of this genus must be accepted as provisional, as only one specimen with much worn teeth has been examined.) 19. NEOTOMODON

Palate extending posteriorly only about to level of hinder part of M.2, or front part of M.3.

Third lower molar S-shaped. 20. HODOMYS

Third lower molar not S-shaped, consisting of two transverse loops. 21. NEOTOMA

The folds of the upper molars in moderately young adult animals are not widely open, and the dentine spaces are less sharply projecting, so that the appearance of the molars is compressed, and not reminiscent of Microtinae. (Folds typically deep but very narrow.)

M.3 is more complex. (Usually the pattern of the upper molars is more angular, with the anterior transverse loop of M.2 and M.3 straight, and with closed triangles more in evidence.) 22. HOLOCHILUS

M.3 is less complex, and smaller. (Usually but not always the pattern of the upper molars is less angular, with the anterior transverse loop of M.2 and M.3 curved to a certain degree, and the closed triangles of the molars less well marked.) 23. SIGMODON

Upper cheekteeth not or less specialized, their cuspidate pattern as a rule not obliterated, and apparent at least at some time of life; usually the molars are not flatcrowned. In a few genera, as *Phyllotis*, *Graomys*, *Eligmodontia*, the molars may have a prismatic appearance, but the molars are never with all folds compressed, deep and narrow (compare *Sigmodon*, *Holochilus*, etc.), and are less Microtine in appearance and less angular than in such forms as *Neotoma*, *Andinomys*, *Chinchillula*, etc. If the crowns are flat, there are clear traces of subsidiary ridges in the outer main folds of the upper series (which do not occur in those genera above), and the folds isolate as islands on crown surface.

Upper incisors clearly grooved. (Cheekteeth strongly cuspidate, compare *Phyllotis*.) 24. REITHRODONTOMYS

Upper incisors plain or scarcely grooved (one subgenus of *Phyllotis* only of those that follow may have weakly grooved incisors).

The cheekteeth are complex, with clear subsidiary ridges normally present in the main outer folds of the first and second upper molars; the teeth are always cuspidate originally, and in most cases through life. (In the genus *Peromyscus*, there is a tendency for the subsidiary ridges to be lost, and in one subgenus this is a fairly constant character, though it contains forms in which these ridges are traceable, and there are intermediate forms between these and typical *Peromyscus*. Members of this group without the subsidiary ridges will stand nearest to *Baiomys* in the key below, from which they differ in the non-reduced coronoid process, and the non-shortened tail.) (Genera Numbers 25 to 39.)

The dentition is weak, the molars rather narrow, the folds usually not approaching each other, and not well marked; the subsidiary ridges are present originally, but may be lost in the adult; the molars tend to become more hypsodont. 25. AKODON

The dentition is stronger, with as a rule relatively broader molars, with well-marked folds; the subsidiary ridges are retained usually through life; the molars generally are brachyodont.

Cusps of upper molars alternating; anterointernal cusp normally suppressed or vestigial; M.3 rather strongly reduced. (Coronoid process much reduced; subsidiary ridges when present retained till old age; M.2 smaller than M.1, compare *Nesomys*.) 26. PEROMYSCUS

Cusps of upper molars opposite, or nearly so; anterointernal cusp not obliterated, excepting *Nesomys*; normally M.3 is not strongly reduced.

Upper incisors strongly pro-odont; braincase much enlarged, but not ridged. 27. CHILOMYS

Upper incisors not pro-odont; braincase when enlarged is strongly ridged.

Fur composed of bristles or spines. 28. NEACOMYS

Fur not spiny.

M.2 essentially like M.1 in size and elements. (Traces of the element corresponding to the anterointernal cusp in M.1 are more or less obliterated.) 29. NESOMYS

M.2 smaller than M.1, or more reduced in elements. (Anterointernal cusp in M.1 retained.)

Anterointernal cusp of M.1 is much reduced.

Feet more modified for arboreal life. Skull specialized, with widened frontals, heavy braincase, as is seen in specialized arboreal genera. 30. NYCTOMYS

Feet not much modified for arboreal life. Skull generalized, with narrow frontals, and moderate braincase. 31. PHAENOMYS

Anterointernal cusp of M.1 is not much reduced.

Palate not reaching posterior part of toothrows, and without lateral pits in posterior portion.

Skull specialized, of arboreal type, with much widened frontals, and large heavy brain-case. M.3 is similar in elements to M.2. Subsidiary ridges of upper molars are reduced. (Tail naked, feet arboreal.)

Pits between cusps of upper molars unusually well developed. Bullae enlarged. 32. OTOTYLOMYS

Pits between cusps of upper molars not specially developed. Bullae small. 33. TYLOMYS

Skull not much modified. M.3 is more reduced than M.2. Subsidiary ridges in upper molars not or less reduced. (Tail usually moderately or well haired.)

Feet modified for arboreal life. Folds of upper cheekteeth never specially widened. 34. RHIPIDOMYS

Feet usually not modified for arboreal life; but if so, folds of upper cheek-teeth conspicuously widened. 35. THOMASOMYS

Palate reaching behind posterior part of tooth-rows, and except in *Scapteromys*, with well-marked lateral pits in posterior portion.

Cheekteeth tending to become more or less flatcrowned early; the outer folds of upper molars isolated, or practically so, on crown surface as islands, early in life.

Outer folds of upper molars isolate as broad islands; general dental pattern simple; M.1 and M.2 with not more than two isolated islands each. 36. SCAPTEROMYS

Outer folds of upper molars isolate as narrow islands; general dental pattern more complex; M.1 and M.2 with three or four isolated islands each. 37. NECTOMYS

Cheekteeth not tending to become flat-crowned until late in life; cusps usually traceable through life; less tendency present for isolating of outer folds as enamel islands.

Braincase scarcely wider than rostrum. (Giant form.) 38. MEGALOMYS

Braincase clearly wider than rostrum. 39. ORYZOMYS

Cheekteeth not excessively complex; the subsidiary ridges in the main outer folds of the upper molars in M.1 and M.2 are not traceable.

Some part of backward prolongation of outer folds in the upper molars definitely isolated as deep and conspicuous pits between the main cusps of the upper molars, in the moderately young animal.

Inner and outer folds of upper molars weak; cheekteeth narrowed; tail clearly more than half head and body length (averaging about 60 per cent in those examined). 40. SCOTINOMYS

Inner and outer folds of upper molars wide and strong; cheekteeth not narrowed; tail shortened, at most 55 per cent of head and body length, usually under 50 per cent; progressively reduced until scarcely longer than hindfoot. Cheekpouches are present. Form heavy, thickset. Feet shortened. M.3 not reduced.

Skull much specialized, with extreme interorbital constriction, parietals narrowed and strongly ridged, rostrum heavy and broadened, braincase narrowed; tendency present for parietal ridges to become fused in fully adult skulls.

Outer side of infraorbital foramen normal, well ridged, with well-marked external plate. 41. CRICETUS

Outer side of infraorbital foramen rounded, abnormal, lacking external plate. 42. MESOCRICETUS

Skull not much specialized, without extreme interorbital constriction, the parietals not narrowed, not or weakly ridged; rostrum not broadened, braincase not narrowed.

Feet much broadened and densely hairy throughout. 43. PHODOPUS

Feet without extreme abnormalities. 44. CRICETULUS

No part of backward prolongation of outer folds of upper molars definitely isolated as conspicuous pits between the main cusps.

Cusps of upper molars unusually raised and heightened, the cheekteeth narrowed (this feature apparent usually even in comparatively old specimens) (M.3

strongly reduced; tail considerably shortened; form thickset; plantar pads reduced). 45. ONYCHOMYS

Cusps of upper molars not unusually raised up and heightened.

Feet apparently considerably specialized for arboreal life. (A little-known form.) 46. RHAGOMYS

Feet not specialized for arboreal life.

Skull with considerable interorbital constriction, this carried far backwards, so that braincase appears shortened. (Molars well cusped in young, but tending to lose cusps in adult; M.3 reduced; tail about 50 per cent of head and body length, or less, in all seen.) 47. MYSTROMYS

Skull with interorbital constriction usually less extreme, and braincase not shortened in appearance.

Cusps of upper molars are not opposite, but alternating. M.3, at least in adult, ring-shaped. (Coronoid process not reduced, compare *Peromyscus*.)

Jugal prominent, relatively long, the zygoma broader; tail not shortened, well tufted terminally. 48. CALOMYSCUS

Jugal short, and zygoma slender; tail shortened, not tufted. 49. BAIOMYS

Cusps of upper molars are, when present, more opposite. M.3 is normally not ring-shaped. Jugal shortened, and zygoma slender (compare *Calomyscus*).

In most cases, the upper molars have the cusps not well marked, and the pattern is more or less prismatic in appearance, or may tend to become a series of transverse plates.

Palms and soles with the pads situated on hairy outgrowths (Thomas). 50. ELIGMODONTIA

Palms and soles usually naked, without abnormalities.

Frontals relatively broad, little constricted, with interorbital region evenly divergent backwards. 51. GRAOMYS

Frontals strongly narrowed, never with interorbital region evenly divergent backwards. 52. PHYLLOTIS

In most cases, the upper molars have the cusps more marked, and there is less tendency for the teeth to take on a prismatic appearance; if molars become more or less a series of transverse plates, the general dentition is much weaker, and less angular in appearance.

Folds of upper molars nearly straight; dentition lighter; no tendency for folds to cut cusp areas into partially closed triangles. 53. ZYGODONTOMYS

Folds of upper molars considerably curved; dentition heavier; a tendency present for folds to cut cusp areas into partially closed triangles. 54. HESPEROMYS

Genus 1. ORYZOMYS, Baird

1857. ORYZOMYS, Baird, Mammals North America, pp. xvi, 458, 482.
1920. MICRORYZOMYS, Thomas, Proc. U.S. Nat. Mus. LVIII, no. 2333, p. 229. (*Hesperomys minutus*, Tomes.) Valid as a subgenus.
1926. THALLOMYSCUS, Thomas, Ann, Mag. Nat. Hist. 9, XVII, p. 612. (*Oryzomys dryas*, Thomas = *Hesperomys minutus*, Tomes) (*fide* Osgood).
1900. OLIGORYZOMYS, Bangs, Proc. New Engl. Zool. Club 1, p. 94. (*Oryzomys navus*, Bangs.) Valid as a subgenus.
1902. MELANOMYS, Thomas, Ann. Mag. Nat. Hist. 7, X, p. 248. (*Oryzomys phaeopus*, Thomas.) Valid as a subgenus.
1904. NESORYZOMYS, Heller, Proc. Cal. Acad. Sci. 3, iii, p. 241. (*Nesoryzomys narboroughi*, Heller.) Valid as a subgenus.
1906. OECOMYS, Thomas, Ann. Mag. Nat. Hist. 7, XVIII, p. 444. (*Rhipidomys benevolens*, Thomas.) Valid as a subgenus.

TYPE SPECIES.—*Mus palustris*, Harlan.

RANGE.—Throughout South America from Southern Patagonia northwards. Galapagos Islands. Central America, and Mexico, including Lower California. Jamaica, St. Vincent. Southern United States, Texas, Alabama, Georgia, Florida, north to New Jersey. (For range map of United States forms see Anthony, Field Book North American Mammals, p. 374, 1928.)

NUMBER OF FORMS.—A hundred and eighty-six approximately.

CHARACTERS.—The skull within this genus is variable. In some forms, such as *devius* and *meridensis*, there is considerable interorbital constriction present; the supraorbital ridges may be rather weak, and the rostrum long; the braincase moderate. In *couesi* and *palustris*, the constriction is less abrupt than in the above, and more gradual; these forms are intermediate between the *devius* type, and the *tectus* type, in which the frontals are relatively very broad, the supraorbital ridges are heavy, and the general form of the skull is such as is met with in arboreal types, and very similar to subgenus *Oecomys*, to which *tectus* probably belongs. The most aberrant cranial characters are found in *Melanomys*, which will be dealt with below. Supraorbital ridges may be present or absent within the genus. The interparietal is well developed in all seen. Zygomatic plate usually slightly cut back above; more or less straight in most members of subgenus *Oecomys*, and completely so in *Microryzomys*; more strongly thrown forward than usual in *lamia*, *wavrini* (with anterior border concave), *ratticeps*, *boliviae*, *legatus*, and probably *laticeps*. The skull of *O. angouya* agrees in arboreal form evidently with that of *tectus*, as does that of *flavicans*. The form *ochrinus*, described as a race of *barbacoas*, has a heavier rostrum than is normal, and very broad heavy incisors. *O. wavrini* is an aberrant type, with the skull like that of a *Hesperomys*, and the dental pattern not extremely different from that genus; but the subsidiary ridges are in *wavrini* not suppressed, though very reduced. Incisive foramina variable in length, not approaching toothrows in *tectus*, *laticeps*, and several others. Palate extending behind toothrows, and with lateral pits present each side in posterior portion. Bullae normally small to very small, but conspicuously enlarged in *pyrrhorhinus*.

Upper cheekteeth three-rooted, lowers two-rooted (Goldman). The upper cheekteeth are brachyodont, with rather low cusps, but these normally retained until the whole pattern is obliterated; the general pattern very complex. The cusps are symmetrical, six in M.1, four in M.2, and M.3 has two front ones, but the posterior elements of the tooth are reduced, and not clear. As a rule this tooth is little reduced in size. The folds are well marked, relatively narrow in adult, but very clear; four in M.*1* (two each side), and three (two outer, one inner) in M.2; in each outer fold of M.*1* and M.2 there is a well-marked subsidiary ridge, which persists through life; the folds tend to approach each other across the tooth; each tooth has normally several small isolated islands in the adult; the main folds do not as a rule completely isolate until old age, if then. The pattern changes relatively slowly with wear, apparently. In specimens seen of *xanthaeolus* and of *polius* the subsidiary ridges are rather strongly reduced. *O. intectus* has a highly aberrant dentition, with the cusps obliterated and the folds more or less isolating; the subsidiary ridges are weak; the second outer fold of M.1 and M.2 is unusually long; this species should, I think, be transferred to the genus *Nectomys*.

Lower cheekteeth: M.3 often rather long; two outer, three inner folds in M.1, the posterointernal fold with a terminal heel behind it. M.2 with two folds each side, the anteroexternal one small. M.3 much like M.2, except that the posterointernal cusp is reduced. Subsidiary ridges originally traceable in the main folds of both sides; with wear the inner folds may isolate as islands.

Mammae 2—2 =8 (Gyldenstolpe). Form Rat-like. Tail typically poorly haired, not reduced in length; in *pyrrhorhinus* very much longer than head and body (over 150 per cent of this measurement, or up to 170 per cent apparently). Hindfoot typically with the three centre digits considerably longer than the outer pair, the foot narrow. In some species, as *pyrrhorhinus* and *tectus*, the foot is as highly modified for arboreal life as in subgenus *Oecomys*, to which they will probably be transferred when the genus is revised, with broadened foot and relatively long D.5; between these and normal *Oryzomys* exist intermediates such as *ratticeps*, *subflavus*, *angouya*, and *fulviventer*, in which the foot is as broad as *Oecomys*, but D.5 is not specially lengthened. Whether under these circumstances *Oecomys* can be even retained as a subgenus is questionable.

It will be seen from the above notes that the subgenus *Oryzomys* contains probably several well-marked groups in South America. There is no doubt that in the final revision the species *pyrrhorhinus*, with its arboreal feet, exceptionally long tail, and strongly enlarged bullae, whether classed as *Oecomys* or *Oryzomys*, will be the type of a very distinct group or probably subgenus. I have treated it here as a species group; it is completely distinct from all *Oryzomys* seen. The species is thought by Tate, 1932, to be a *Rhipidomys*; but the palate of the one skull seen seems to agree with *Oryzomys* in the presence of small lateral pits; though it is not very typical of *Oryzomys*. The remainder of the species from South America I have listed alphabetically, but I have given full notes on all forms seen which deviate markedly from the normal. Five groups have been given subgeneric or generic rank which are here retained in *Oryzomys*.

Oecomys.—About twenty-six forms have been referred to this group, which is currently accepted as a full genus. The skull is with short rostrum, broad braincase, interorbital constriction not much marked, and supraorbital ridges evenly divergent backwards; bullae relatively small; zygomatic plate normally straight anteriorly; palate and dentition as *Oryzomys*; feet broadened and modified to a degree for arboreal life, with long fifth digit in hindfoot (about as *Rhipidomys*, or perhaps a little less specialized); tail long, moderately haired, faintly tufted terminally. Mammae as *Oryzomys*, 2—2—8.

The group was originally proposed as a subgenus of *Oryzomys*, and later given full generic rank on the grounds that as well as in the external characters it differed from *Oryzomys* in the fact that the zygomatic plate is straight anteriorly, whereas in *Oryzomys* it is slightly cut back above. But I cannot distinguish the zygomatic plate of *Oryzomys tectus* from *Oecomys osgoodi*; while *Oecomys catherinae* has the zygomatic plate cut back, as in typical *Oryzomys*; and elsewhere in *Oryzomys* (subgenus *Microryzomys*) the zygomatic plate is straight. I have just shown that the feet of *Oecomys* are no more specialized than those of *Oryzomys tectus* and *Oryzomys pyrrhorhinus*, while *ratticeps*, *subflavus*, *angouya*, etc., appear intermediate between the two. Even *O. couesi* appears to lean in the direction of *Oecomys* in foot structure. Under the circumstances, I do not see how *Oecomys* can be regarded as more than a doubtfully distinguishable subgenus, until the whole genus is revised. The one character for *Oecomys* which remains is its slightly tufted tail (!). Goldman, in his revision of North American *Oryzomys*, writing of the *tectus* group, states that in general characters "they approach that section (of *Oryzomys*) assigned to generic rank by Thomas under the name *Oecomys*."

Oligoryzomys contains a group of very small species, and as remarked by Goldman, departs from the subgenus *Oryzomys* mainly in the combination of relative rather than absolute characters. The species referred to the group are small forms with delicate unridged skull. The coronoid process is rather low, as may sometimes occur in *Oryzomys*. "The molar crowns differ in details of enamel arrangement, the second upper molar especially in the early appearance of a single persistent normally circular enamel island in the broad space between the apex of the inner re-entrant angle and the base of the paracone. In the subgenus *Oryzomys*, this molar crown varies in pattern, in the more typical forms normally it is present in early stages of wear as an elongated crescentic enamel island in the central space, but in the more divergent forms the enamel island may be absent." M.3 may be relatively small. Tail considerably longer than head and body.

NESORYZOMYS from the Galapagos was proposed as a full genus. Like *Oryzomys*, "but interorbital portion of skull very different, the frontal bones medially much narrower, with rounded sides at interorbital constriction; snout more elongate; nasals narrower, considerably longer, and less convex in profile. Zygomatic width and length of upper molar series less." Goldman in his revision of Nearctic *Oryzomys* suggests that the genus is probably not valid. It would seem that these Galapagos species are merely at one end of the series of *Oryzomys* in skull characters; it does not seem necessary to regard the group as a full genus. The following measurements (from Gyldenstolpe) given below indicate that the differences between the species and certain *Oryzomys* are present but not excessive. (Types.)

	GREATEST LENGTH	ZYGOMATIC BREADTH	NASALS	LEAST INTERORBITAL	UPPER MOLARS
Nesoryzomys darwini .	30	14·6	12·6	4·3	4·8
Oryzomys sylvaticus .	30·5	15	12	4·9	4·5
Oryzomys yunganus .	31·3	16·5	12·1	4·5	4·9

It is curious that this distinct group should be living side by side with the ordinary *Oryzomys galapagoensis* in such a remote place as the Galapagos. Hindfoot broad; fur thick; tail rather shorter than head and body. Dentition normal.

The two following groups are much more differentiated from typical *Oryzomys* than are the above.

MICRORYZOMYS (synonym, *Thallomyscus*). This subgenus was based on a species *minutus*, the type skull of which is apparently in fragments, and which seems to be more or less unidentifiable. Thomas regarded his species *dryas* as not congeneric with *minutus*, and erected "*Thallomyscus*" for it, at the same time referring his name *Microryzomys* to a synonym of *Oligoryzomys*. Recently Osgood (1933, Field Mus. Nat. Hist. Zool., ser. XX, p. 1), who has given characters to distinguish between *Microryzomys* and *Oligoryzomys*, and regards the group as a valid subgenus, has revived the name *Microryzomys*, stating that *dryas* is a synonym of *minutus*; and thereby synonymizing *Thallomyscus*. He regards the group as not distantly allied to *Thomasomys*, from which it differs in its normal *Oryzomys*-like palate. The rostrum is slender, the zygomatic plate much narrowed, and straight anteriorly; the cheekteeth are relatively small.

The size is very small, the fur thick, and the tail very much longer than head and body (sometimes almost twice as long). D.5 of hindfoot relatively long.

MELANOMYS is regarded as a subgenus of *Oryzomys* by Goldman, who has revised the North American species, so it is here retained as such; but on cranial characters alone I should be prepared to give it generic rank, if it had not been for Goldman's classification. The frontals are extremely broad for a Murine, and there is almost no trace of interorbital constriction; the braincase is more broadened than other species of *Oryzomys* examined. The rostrum is short. Palatal foramina short in those seen; bullae small; zygomatic plate very slightly cut back above. Lachrymal articulating mainly with maxilla (about equally with maxilla and frontal in normal *Oryzomys*). Supraorbital ridges developed. Interparietal large. Upper cheekteeth rather more hypsodont than other subgenera; the subsidiary ridge in first outer fold of M.1 appears to fuse with the anteroexternal cusp. (Few skulls available for examination; for full dental particulars see Goldman, North. Amer. Fauna, 1918, no. 43, in which it is fully compared with the other groups; it is considered as transitionary towards *Nectomys* to a certain degree.) Tail about three-quarters head and body length only, or less. Hindfoot with two outer digits considerably shorter than the central three.

Range.—Colombia, Ecuador, Panama, Costa Rica.

North of Panama, as well as a few forms of *Oligoryzomys* and *Melanomys*, Goldman recognizes the following groups of *Oryzomys* s.s.:

palustris group, with the central enamel island crescentic-shaped and present in M.2 upper, and differing from the other groups in the absence of conspicuous tufts of bristles which in other groups project beyond ends of claws of hindfeet; ears small; form robust.

melanotis group, slender species with large ears; differing evidently in colour from the above; dentition similar, but re-entrant folds of molars longer.

alfaroi group: small dark forms, with comparatively large ears; skull small and delicate, dentition like *melanotis* group.

talamancae group: resembling the last, but the enamel island in M.2 is absent, and the third lower molar is more than half cleft by the deep outer re-entrant fold.

bombycinus group, differing from others in unusually long pelage. Dentition about as in *talamancae* group.

devius group, distinguished by large but rather slender form, long tail (much longer than head and body), and general dark coloration.

tectus group, with short, stout hindfeet, large size, small ears, broad skull; dentition much as in *talamancae* group.

Most of these groups occur in South America; Goldman refers the Neotropical *meridensis* and *maculiventer* to the *devius* group; *flavicans* and *palmarium* to the *tectus* group, and *mollipilosus* and *medius* to the *talamancae* group.

Forms seen: *aurillus*, *alfaroi*, *albigularis*, *angouya*, *aquaticus*, *arenalis*, *aureiventer*, *benevolens*, *bicolor*, *balneator*, *bombycinus*, *bolivaris*, *boliviae*, *castaneus*, *childi*, *catherinae*, *caracolus*, *chapmani*, *couesi*, *costaricensis*, *copperingi*, *caliginosus, chrysomelas, delticola, dryas, devius, eliurus, flavescens, flavicans, fulvescens, fulgens, fulviventer, fulvirostris, galapagoensis, goeldi, gracilis, guianae, humilior, indefessus, intectus, intermedius, jalapae, keaysi, lamia, laticeps, levipes, longicaudatus, legatus, mamorae, marmosurus, magellanicus, macconnelli, maculiventer, melanotis, meridensis, messorius, minutus, mizurus, mexicanus, moerex, nitidus, nitedulus, narboroughi, osgoodi, olivinus, obscurior, ochrinus, oniscus, paricola, palmeri, paraganus, palustris, palmirae, panamensis, pererensis, peninsulae, polius, pyrrhorhinus, pectoralis, phaeopus, phaeotis, rostratus, ratticeps, robustulus, rex, roberti, rivularis, rosilla, subflavus, subluteus, stolzmanni, superans, sylvaticus, tropicius, tapajinus, tectus, trinitatis, victus, vegetus, velutinus, wavrini, xanthaeolus, yunganus, splendens* (*Oecomys splendens*, Hayman, 1938, from Trinidad).

List of Named Forms

Subgenus *Oryzomys*, Baird

(Forms occurring north of Panama revised by Goldman, North Amer. Fauna, 43, 1918.)

palustris Group

1. ORYZOMYS PALUSTRIS PALUSTRIS, Harlan

1837. Amer. Journ. Sci. XXXI, p. 385.
Fast Land in vicinity of Salem, New Jersey.
Synonym: (?) *oryzivora*, Audubon & Bachman, 1853, Quadr. iii, p. 214 S. Carolina.

2. ORYZOMYS PALUSTRIS NATATOR, Chapman

1893. Bull. Amer. Mus. Nat. Hist. V, p. 44.
Gainesville, Alachua Co., Florida.

3. ORYZOMYS PALUSTRIS COLORATUS, Bangs

1898. Proc. Boston Soc. Nat. Hist. XXVIII, p. 189.
Cape Sable, Monroe Co., Florida.
Synonym: *floridanus*, Merriam, 1901, Proc. Washington Acad. Sci. III, p. 277.

4. ORYZOMYS PALUSTRIS TEXENSIS, Allen

1894. Bull. Amer. Mus. Nat. Hist. VI, p. 177.
Rockport, Aransas Co., Texas.

5. ORYZOMYS COUESI COUESI, Alston

1876. Proc. Zool. Soc. London, p. 756.
Coban, Guatemala.
Synonym: *jalapae*, Allen & Chapman, 1897, Bull. Amer. Mus. Nat. Hist. IX, p. 206. Jalapa, Vera Cruz.
teapensis, Merriam, 1901, Proc. Washington Acad. Sci. III, p. 286. Teapa, Tabasco, Mexico.
goldmani, Merriam, 1901, Proc. Washington Acad. Sci. III, p. 288. Coatzacoalcos, Vera Cruz.
rufinus, Merriam, 1901, Proc. Washington Acad. Sci. III, p. 285. Catemaco, Vera Cruz.
richardsoni, Allen, 1910, Bull. Amer. Mus. Nat. Hist. XXVIII, p. 99. Pena Blanca, Nicaragua.
apatelius, Elliot, 1904, Field Col. Mus. pub. 90, z.s. 3, p. 266. San Carlos, Vera Cruz.

6. ORYZOMYS COUESI RICHMONDI, Merriam

1901. Proc. Washington Acad. Sci. III, p. 284.
Escondido River, 50 miles above Bluefields, Nicaragua.

7. ORYZOMYS COUESI ZYGOMATICUS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 285.
Nenton, Guatemala.

8. ORYZOMYS COUESI MEXICANUS, Allen

1897. Bull. Amer. Mus. Nat. Hist. IX, p. 52.
Hacienda San Marcos, Tonila, Jalisco, Mexico.
Synonym: *bulleri*, Allen, 1897, Bull. Amer. Mus. Nat. Hist. IX, p. 53. Nayarit, Mexico.
rufus, Merriam, 1901, Proc. Washington Acad. Sci. III, p. 287. Nayarit, Mexico.

9. ORYZOMYS COUESI AZTECUS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 282.
Yautepec, Morelos, Mexico.

10. ORYZOMYS COUESI CRINITUS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 281.
Tlalpam, Federal district, Mexico.

11. ORYZOMYS COUESI REGILLUS, Goldman

1915. Proc. Biol. Soc. Washington, XXVIII, p. 129.
Los Reyes, Michoacan, Mexico.

12. ORYZOMYS COUESI ALBIVENTER, Merriam

1901. Proc. Washington Acad. Sci. III, p. 279.
Ameca, Jalisco, Mexico.
Synonym: *molestus*, Elliot, 1903, Field Columb. Mus. publ. 71, z.s. 3, p. 145. Ocotlan, Jalisco.

13. ORYZOMYS COUESI PERAGRUS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 283.
Rio Verde, San Luis Potosi, Mexico.

14. ORYZOMYS COUESI AQUATICUS, Allen

1891. Bull. Amer. Mus. Nat. Hist. III, p. 289.
Brownsville, Cameron Co., Texas.

15. ORYZOMYS COUESI PINICOLA, Murie

1932. Occ. Pap. Mus. Zool. Univ. Mich. no. 245, p. 1.
12 miles south of El Cayo, British Honduras.

16. ORYZOMYS COUESI LAMBI, Burt

1934. Proc. Biol. Soc. Washington, XLVII, p. 107.
Sonora, Mexico.

17. ORYZOMYS FULGENS, Thomas

1893. Ann. Mag. Nat. Hist. 6, II, p. 403.
Mexico, probably in or near Valley of Mexico.

18. ORYZOMYS GATUNENSIS, Goldman

1912. Smiths. Misc. Coll. LVI, 36, p. 7.
Gatun, Canal Zone, Panama.

19. ORYZOMYS COZUMELAE, Merriam

1901. Proc. Biol. Soc. Washington, XIV, p. 103.
Cozumel Island, Yucatan, Mexico.

20. ORYZOMYS ANTILLARUM, Thomas
1898. Ann. Mag. Nat. Hist. 7, I, p. 177.
Jamaica.

21. ORYZOMYS PENINSULAE, Thomas
1897. Ann. Mag. Nat. Hist. 6, XX, p. 548.
Santa Anita. Lower California.

22. ORYZOMYS NELSONI, Merriam
1898. Proc. Biol. Soc. Washington, XII, p. 15.
Maria Madre Island, Tres Marias Islands, Jalisco, Mexico.

melanotis Group

23. ORYZOMYS MELANOTIS MELANOTIS, Thomas
1893. Ann. Mag. Nat. Hist. 6, XI, p. 404.
Mineral San Sebastian, Jalisco, Mexico.

24. ORYZOMYS MELANOTIS COLIMENSIS, Goldman
1918. North Amer. Fauna, no. 43, p. 51.
Armeria, Colima, Mexico.

25. ORYZOMYS ROSTRATUS ROSTRATUS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 293.
Metlaltoyuca, Puebla, Mexico.

26. ORYZOMYS ROSTRATUS MEGADON, Merriam
1901. Proc. Washington Acad. Sci. III, p. 294.
Teapa, Tabasco, Mexico.

27. ORYZOMYS ROSTRATUS YUCATANENSIS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 294.
Chichenitza, Yucatan, Mexico.

alfaroi Group

28. ORYZOMYS ALFAROI ALFAROI, Allen
1891. Bull. Amer. Mus. Nat. Hist. III, p. 214.
San Carlos, Costa Rica.
Synonym: *incertus*, Allen, 1908, Bull. Amer. Mus. Nat. Hist. XXIV, p. 655. Rio Grande, Nicaragua.

29. ORYZOMYS ALFAROI DARIENSIS, Goldman
1915. Proc. Biol. Soc. Washington, XXVIII, p. 128.
Cana, E. Panama.

30. ORYZOMYS ALFAROI ANGUSTICEPS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 292.
Volcan Santa Maria, Guatemala.

31. ORYZOMYS ALFAROI RHABDOPS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 291.
Calel, Guatemala.

32. ORYZOMYS ALFAROI CAUDATUS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 289.
Comatepec, Oaxaca, Mexico.

33. ORYZOMYS ALFAROI PALATINUS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 290.
Teapa, Tabasco, Mexico.

34. ORYZOMYS ALFAROI SATURATIOR, Merriam
1901. Proc. Washington Acad. Sci. III, p. 290.
Tumbala, Chiapas, Mexico.

35. ORYZOMYS ALFAROI CHAPMANI, Thomas
1898. Ann. Mag. Nat. Hist. 7, I, p. 179.
Jalapa, Vera Cruz, Mexico.

36. ORYZOMYS ALFAROI DILUTIOR, Merriam
1901. Proc. Washington Acad. Sci. III, p. 290.
Huauchinango, Puebla, Mexico.

37. ORYZOMYS GUERRERENSIS, Goldman
1915. Proc. Biol. Soc. Washington, XXVIII, p. 127.
Omilteme, Guerrero, Mexico.

38. ORYZOMYS HYLOCETES, Merriam
1901. Proc. Washington Acad. Sci. III, p. 291.
Chicharras, Chiapas, Mexico.

talamancae Group

39. ORYZOMYS TALAMANCAE, Allen
1891. Proc. U.S. Nat. Mus. XIV, p. 193.
Talamanca, Costa Rica.
Synonym: *carrikeri*, Allen, 1908, Bull. Amer. Mus. Nat. Hist. XXIV, p. 656. Talamanca, Costa Rica.
panamensis, Thomas, 1901, Ann. Mag. Nat. Hist. 7, VIII, p. 252. Panama.

bombycinus Group

40. ORYZOMYS BOMBYCINUS BOMBYCINUS, Goldman
1912. Smiths. Misc. Coll. LVI, no. 36, p. 6.
Cerro Azul, near headquarters of Chagres River, Panama.

41. ORYZOMYS BOMBYCINUS ALLENI, Goldman
1915. Proc. Biol. Soc. Washington, XXVIII, p. 128.
Tuis, about 35 miles east of Cartago, Costa Rica.

devius Group

42. ORYZOMYS DEVIUS, Bangs
1902. Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 34.
Boquete, Chiriqui, Panama.

43. ORYZOMYS PIRRENSIS, Goldman
1913. Smiths. Misc. Coll. LX, 22, p. 5.
Near Head of Rio Limon, Mt. Pirri, E. Panama.

tectus Group (belonging to subgenus *Oecomys*?)

44. ORYZOMYS TECTUS TECTUS, Thomas
1901. Ann. Mag. Nat. Hist. 7, VIII, p. 251.
Bogava, Chiriqui, Panama.

45. ORYZOMYS TECTUS FRONTALIS, Goldman
1912. Smiths. Misc. Coll. LVI, 36, p. 6.
Corozal, Canal Zone, Panama.

Not allocated to Group

46. ORYZOMYS VICTUS, Thomas
1898. Ann. Mag. Nat. Hist. 7, I, p. 178.
St. Vincent, Lesser Antilles.
("Not examined and group association not determined" (Goldman).)

47. ORYZOMYS APHRASTUS, Harris
1932. Occ. Pap. Mus. Zool. Univ. Mich. 248, p. 5.
Joquin de Dota, Costa Rica.

South American Species

pyrrhorhinus Group

48. ORYZOMYS PYRRHORHINUS, Wied
1826. Beitr. Naturgesch. Bras. II, p. 418.
Bahia Province, E. Brazil.

Other species, not allocated to Groups

49. ORYZOMYS ALBIGULARIS ALBIGULARIS, Tomes
1860. Proc. Zool. Soc. London, p. 264.
Pallatanga, Central Ecuador.

50. ORYZOMYS ALBIGULARIS MACULIVENTER, Allen
1899. Bull. Amer. Mus. Nat. Hist. XII, p. 204.
Sierra El Libano, Santa Marta district, N.-E. Colombia.
(Belonging to Nearctic *devius* group (Goldman).)

51. ORYZOMYS ALBIGULARIS MOEREX, Thomas
1914. Ann. Mag. Nat. Hist. 8, XIV, p. 241.
Mindo, W. Ecuador.

52. ORYZOMYS ANGOUYA, Desmarest
1819. Nouv. Dict. Hist. Nat., 2nd. ed. Art. Rat. p. 22.
Paraguay.
(Perhaps a member of subgenus *Oecomys*.)

53. ORYZOMYS AURIVENTER AURIVENTER, Thomas
1899. Ann. Mag. Nat. Hist. 7, IV, p. 379.
Mirador, Upper Rio Pastaza, E. Ecuador.

54. ORYZOMYS AURIVENTER NIMBOSUS, Anthony
1926. Amer. Mus. Nov. 240, p. 4.
San Antonio, Rio Ulva, E. Ecuador.

55. ORYZOMYS BALNEATOR BALNEATOR, Thomas
1900. Ann. Mag. Nat. Hist. 7, V, p. 273.
Mirador, Upper Rio Pastaza, E. Ecuador.

56. ORYZOMYS BALNEATOR HESPERUS, Anthony
1924. Amer. Mus. Nov. 139, p. 7.
El Chiral, Province del Oro, S.-W. Ecuador.

57. ORYZOMYS BARBACOAS BARBACOAS, Allen
1916. Bull. Amer. Mus. Nat. Hist. XXXV, p. 85.
Barbacoas, S.-W. Colombia.

58. ORYZOMYS BARBACOAS OCHRINUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VII, p. 449.
West of Quito, Ecuador.
(For note on cranial peculiarities of this form see page 341.)

59. ORYZOMYS BAURI, Allen

1892. Bull. Amer. Mus. Nat. Hist. IV, p. 48.
Barrington Island, Galapagos Islands.
(According to Osgood "hardly separable from *O. galapagoensis*" (Gyldenstolpe).)

60. ORYZOMYS BOLIVARIS, Allen

1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 405.
Porvenir, Bolivar Province, Ecuador.

61. ORYZOMYS BOLIVIAE, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 536.
Mapiri, Upper Rio Beni, N. Bolivia.

62. ORYZOMYS CARACOLUS, Thomas

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 242.
Galipare, Cerro del Avila, N. Venezuela.

63. ORYZOMYS CASTANEUS, Allen

1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 406.
San Janvier, N.-W. Ecuador.

64. ORYZOMYS CHAPARENSIS, Osgood

1916. Field Mus. Nat. Hist. Zool. ser. X, no. 14, p. 205.
Todos Santos, Rio Chapare, Cochabamba district, E. Bolivia.

65. ORYZOMYS CHILDI, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 59.
Bogota region, Central Colombia.
(Probably identical with *meridensis*, according to Gyldenstolpe.)

66. ORYZOMYS COPPINGERI, Thomas

1881. Proc. Zool. Soc. London, p. 4.
Cockle Cove, Madre de Dios Island, Trinidad Channel, S. Chile.

67. ORYZOMYS DELTICOLA, Thomas

1917. Ann. Mag. Nat. Hist. 8, XX, p. 96.
Isla Ella, Parana Delta, Buenos Aires Province, E. Argentina.

68. ORYZOMYS ELIURUS, Wagner

1845. Archiv. für Naturgesch. XI, 1, p. 147.
Ytarare, San Paulo Province, E. Brazil.
Synonym: *pygmaeus*, Wagner, Archiv. für Naturgesch. XI, 1, 1845, p. 147. Ypanema, E. Brazil.
nigripes, Desmarest, Nouv. Dict. Hist. Nat. XXIX, p. 64, 1819. Paraguay.

69. ORYZOMYS FLAVESCENS, Waterhouse

1837. Proc. Zool. Soc. London, p. 19.
Maldonado, Uruguay.

70. ORYZOMYS FLAVICANS FLAVICANS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 351.
Merida, Venezuela.
(Belonging to Nearctic *tectus* group (Goldman).)

71. ORYZOMYS FLAVICANS SUBLUTEUS, Thomas

1898. Ann. Mag. Nat. Hist. 7, II, p. 268.
Cundinamarca district, W. Colombia.

72. ORYZOMYS FULVIVENTER, Allen

1899. Bull. Amer. Mus. Nat. Hist. XII, p. 212.
Quebrada Secca, Cumana district, N. Venezuela.

73. ORYZOMYS GALAPAGOENSIS, Waterhouse

1839. Zool. Voy. Beagle, pt. ii, Mamm. p. 65.
Chatham Island, Galapagos Islands.

74. ORYZOMYS GOELDII, Thomas

1897. Ann. Mag. Nat. Hist. 6, XIX, p. 494.
Itaituba, Rio Tapajoz, Central Brazil.

75. ORYZOMYS GRACILIS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 358.
Concordia, Medellin, Antioquia district, Colombia.

76. ORYZOMYS HELVOLUS, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 597.
Villavicencio, E. Colombia.

77. ORYZOMYS INTECTUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 356.
Santa Elena, Medellin, Antioquia district, Colombia.
(This species is, I think, a *Nectomys*, not an *Oryzomys*.)

78. ORYZOMYS KEAYSI, Allen

1900. Bull. Amer. Mus. Nat. Hist. XIII, p. 225.
Inca Mines, Rio Inambari, S.-E. Peru.

79. ORYZOMYS LAMIA, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 528.
Paranahyba, Rio Jordão, S.-W. Minas Geraes, E. Brazil.

80. ORYZOMYS LATICEPS LATICEPS, Lund

1841. K. Danske Vidensk. Selsk, Afhandl. VIII, p. 279.
Lagoa Santa, Rio des Velhas, Minas Geraes, E. Brazil.
Synonym: *saltator*, Winge, 1888, E. Museo Lundii, 1, 3, p. 48.

81. ORYZOMYS LATICEPS INTERMEDIUS, Leche

1886. Zool. Jahrb. 1, p. 693.
Taquara de Mundo Novo, Rio Grande do Sul, S. Brazil.

82. ORYZOMYS LATICEPS MAGDALENAE, Allen

1899. Bull. Amer. Mus. Nat. Hist. XII, p. 209.
Minca, Santa Marta district, N.-E. Colombia.

83. ORYZOMYS LATICEPS NITIDUS, Thomas

1884. Proc. Zool. Soc. London, p. 452.
Amable Maria, Rio Chanchamayo, Peru.

84. ORYZOMYS LATICEPS PERENENSIS, Allen

1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 406.
Perene, Junin district, Central Peru.

85. ORYZOMYS LEGATUS, Thomas

1925. Ann. Mag. Nat. Hist. 9, XV, p. 577.
Carapari, Yacuiba, Tarija district, S. Bolivia.

86. ORYZOMYS LEVIPES, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 129.
Limbane, Puno district, S.-E. Peru.
(Probably identical with *keaysi*, according to Gyldenstolpe.)

87. ORYZOMYS LONGICAUDATUS LONGICAUDATUS, Bennet

1832. Proc. Zool. Soc. London, p. 2.
W. Chile.
Synonym: *philippii*, Landbeck, Arch. für Naturgesch. XXIV, 1, 1858, p. 80. Chile.
macrocercus, Philippi, 1900, Ann. Mus. Nac. Chile, p. 30. Colchagua Province, Chile.
nigribarbis, Philippi, same reference, p. 31. Talcaregue Andes, Chile.
saltator, Philippi, same reference, p. 32. Peine, Santiago Province, Chile.
amblyrrhynchus, Philippi, same reference, p. 36. Valdivia Province, Chile.
diminutivus, Philippi, same reference, p. 43. Illapel, O'Higgins Province, Chile.
petroanus, Philippi, same reference, p. 56. Peteroa, Curica Province, Chile.

88. ORYZOMYS LONGICAUDATUS DESTRUCTOR, Tschudi

1844. Unters. u. d. Fauna Peruana, 1, p. 182.
E. Peru.
Synonym: (?) *melanostroma*, Tschudi, same reference. Peru.

89. ORYZOMYS LONGICAUDATUS MAGELLANICUS, Bennet

1835. Proc. Zool. Soc. London, p. 191.
Port Famine, Straits of Magellan, S. Chile.

90. ORYZOMYS LONGICAUDATUS MIZURUS, Thomas

1916. Ann. Mag. Nat. Hist. 8, XVII, p. 186.
Koslowsky Valley, Chubut Territory, S. Patagonia.
(Probably = *l. longicaudatus* (Gyldenstolpe).)

91. ORYZOMYS MACCONNELLI, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 186.
Rio Supinaam, Demerara district, British Guiana.

92. ORYZOMYS MEDIUS, Robinson & Lyon

1901. Proc. U.S. Nat. Mus. XXIV, 1246, p. 142.
San Julian, east of La Guaira, N. Venezuela.
(Belonging to Nearctic *talamancae* group (Goldman).)

93. ORYZOMYS MERIDENSIS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 351.
Merida, W. Venezuela.
(Belonging to Nearctic *devius* group (Goldman).)

94. ORYZOMYS MODESTUS, Allen

1899. Bull. Amer. Mus. Nat. Hist. XII, p. 212.
Campo Alegre, Cumana district, Venezuela.

95. ORYZOMYS MOLLIPILOSIS, Allen

1894. Bull. Amer. Mus. Nat. Hist. XII, p. 208.
Valparaiso, Santa Marta district, N.-E. Colombia.
(Belonging to Nearctic *talamancae* group (Goldman).)

96. ORYZOMYS MURELIAE, Allen

1915. Bull. Amer. Mus. Nat. Hist. XXXIV, p. 630.
Muralla, Rio Bodoquena, Caqueta region, E. Colombia.
Synonym: *incertus*, Allen, 1913, Bull. Amer. Mus. Nat. Hist. XXXII, p. 598 (preoccupied).

97. ORYZOMYS O'CONNELLI, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 597.
Buenavista, E. Colombia.

98. ORYZOMYS ONISCUS, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIII, p. 142.
São Lorenzo, Pernambuco Province, E. Brazil.

99. ORYZOMYS PALMARIUS, Allen

1899. Bull. Amer. Mus. Nat. Hist. XII, p. 210.
Quebrada Secca, Cumana district, N. Venezuela.
(Belonging to *tectus* group (Goldman).)

100. ORYZOMYS PALMIRAE, Allen

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 83.
Palmira, Central Colombia.

101. ORYZOMYS PECTORALIS, Allen

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 83.
Popayan, Cauca district, W. Colombia.

102. ORYZOMYS POLIUS, Osgood

1913. Field Mus. Nat. Hist. Zool. ser. X, 9, p. 97.
Tambo Carrizal, east of Balsas Mountains, N. Peru.

103. ORYZOMYS RATTICEPS RATTICEPS, Hensel

1873. Abhandl. K. Preuss. Akad. Wiss. Berlin, 1872, p. 36.
Rio Grande do Sul Province, S. Brazil.

104. ORYZOMYS RATTICEPS PARAGANUS, Thomas

1924. Ann. Mag. Nat. Hist. 9, XIV, p. 144.
Sapucay, Paraguay.

105. ORYZOMYS RATTICEPS TROPICIUS, Thomas

1924. Ann. Mag. Nat. Hist. 9, XIV, p. 143.
Piquete, São Paulo Province, Brazil.

106. ORYZOMYS RIVULARIS, Allen

1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 407.
Rio Verde, N. Ecuador.

107. ORYZOMYS SPECIOSUS, Allen & Chapman

1893. Bull. Amer. Mus. Nat. Hist. V, p. 212.
Princestown, Trinidad.

108. ORYZOMYS SUBFLAVUS, Wagner

1842. Arch. für Naturgesch. VIII, p. 362.
Brazil.
Synonym: *vulpinoides*, Schinz, Syn. Mamm. ii, p. 193, 1845.
vulpinus, Lund, K. Danske. Vidensk. Selsk, Afhandl. VIII, 1841, p. 279.

109. ORYZOMYS SYLVATICUS, Thomas

1900. Ann. Mag. Nat. Hist. 7, V, p. 272.
Santa Rosa, S. Ecuador.

110. ORYZOMYS TENUICAUDA, Allen
1899. Bull. Amer. Mus. Nat. Hist. XII, p. 211.
Las Palmales, Cumana district, N. Venezuela.

111. ORYZOMYS TRICHURUS, Allen
1899. Bull. Amer. Mus. Nat. Hist. XII, p. 206.
Bonda, Santa Marta district, Colombia.

112. ORYZOMYS TRINITATIS, Allen & Chapman
1893. Bull. Amer. Mus. Nat. Hist. V, p. 213.
Princestown, Trinidad.

113. ORYZOMYS VETULINUS, Allen & Chapman
1893. Bull. Amer. Mus. Nat. Hist. V, p. 214.
Princestown, Trinidad.

114. ORYZOMYS VILLOSUS, Allen
1899. Bull. Amer. Mus. Nat. Hist. XII, p. 210.
Valparaiso, Santa Marta district, N.-E. Colombia.

115. ORYZOMYS VINCENIANUS, Allen
1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 598.
Villavicencio, E. Colombia.

116. ORYZOMYS WAVRINI, Thomas
1921. Ann. Mag. Nat. Hist. 9, VII, p. 177.
N. Chaco, Jesematathla, Paraguay.
(For note on the peculiarities of this species see page 341.)

117. ORYZOMYS XANTHAEOLUS XANTHAEOLUS, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 354.
Tumbez, Pirua, district, N.-W. Peru.

118. ORYZOMYS XANTHAEOLUS BARONI, Allen
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 117.
Malca, Cajabamba district, N.-W. Peru.
(Considered by Gyldenstolpe as not a valid race.)

119. ORYZOMYS YUNGANUS, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 130.
Charuplaya, Rio Securé, Bolivia.

Subgenus *Oligoryzomys*, Bangs

(Forms occurring north of Panama, revised by Goldman, North Amer. Fauna, no. 43, 1918.)

120. ORYZOMYS FULVESCENS FULVESCENS, Saussure
1860. Rev. et. Mag. Zool. p. 102, 2, XII.
State of Vera Cruz, Mexico.

121. ORYZOMYS FULVESCENS LENIS, Goldman
1915. Proc. Biol. Soc. Washington, XXVIII, p. 130.
Los Reyes, Michoacan, Mexico.

122. ORYZOMYS FULVESCENS MAYENSIS, Goldman
1918. North Amer. Fauna, no. 43, p. 92.
Apazote, near Yohaltum, Campeche, Mexico.

123. ORYZOMYS FULVESCENS COSTARICENSIS, Allen

1893. Bull. Amer. Mus. Nat. Hist. V, p. 239.
El General, Costa Rica.
Synonym: *nicaraguae*, Allen, 1910, Bull. Amer. Mus. Nat. Hist. XXVIII, p. 100. Nicaragua.

124. ORYZOMYS FULVESCENS VEGETUS, Bangs

1902. Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 35.
Boquete, Chiriqui, Panama.

South American Forms

125. ORYZOMYS ANDINUS, Osgood

1914. Field Mus. Nat. Hist. Zool. ser. X, p. 156.
Hacienda Llagueda, Upper Rio Chicama, N. Peru.

126. ORYZOMYS ARENALIS, Thomas

1913. Ann. Mag. Nat. Hist. 8, XII, p. 571.
Eten, N.-W. Peru.

127. ORYZOMYS DELICATUS, Allen & Chapman

1897. Bull. Amer. Mus. Nat. Hist. IX, p. 19.
Caparo, Trinidad.

128. ORYZOMYS FULVIROSTRIS, Allen

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 86.
Munchique, Cauca district, Colombia.

129. ORYZOMYS GRISEOLUS, Osgood

1912. Field Mus. Nat. Hist. Publ. Zool. ser. X, p. 49.
West of Paramo de Tama, Upper Rio Tachira, W. Venezuela.

130. ORYZOMYS MATTOGROSSAE, Allen

1916. Bull. Amer. Mus. Nat. Hist. XXV, p. 528.
Utiarity, Rio Papagaio, Matto Grosso, S. Brazil.

131. ORYZOMYS MICROTIS, Allen

1916. Bull. Amer. Mus. Nat. Hist. XXXV, p. 525.
Lower Rio Solimoes, Central Brazil.

132. ORYZOMYS MUNCHIQUENSIS, Allen

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 85.
La Florida, Cauca district, W. Colombia.

133. ORYZOMYS NAVUS NAVUS, Bangs

1899. Proc. Biol. Soc. Washington, XIII, p. 9.
Pueblo Viejo, Sierra Nevada de Santa Marta, Colombia.

134. ORYZOMYS NAVUS MESSORIUS, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 151.
Kanuku Mountains, British Guiana.

135. ORYZOMYS STOLZMANNI STOLZMANNI, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 357.
Huambo, N. Peru.

136. ORYZOMYS STOLZMANNI MARANONICUS, Osgood

1914. Field Mus. Nat. Hist. Publ. Zool. ser. XX, p. 5.
Hacienda Limon, Balsus, Rio Marañon, Peru.

137. ORYZOMYS TENUIPES, Allen
1904. Bull. Amer. Mus. Nat. Hist. XX, p. 328.
Sierra de Merida, W. Venezuela.

138. ORYZOMYS UTIARITENSIS, Allen
1916. Bull. Amer. Mus. Nat. Hist. XXXV, p. 527.
Utiarity, Rio Papagaio, Matto Grosso, Brazil.

Subgenus *Microryzomys*, Thomas

(Synonym: *Thallomyscus*, Thomas; *fide* Osgood)

139. ORYZOMYS MINUTUS MINUTUS, Tomes
1860. Proc. Zool. Soc. London, p. 215.
Pallatanga, Central Ecuador.
Synonym: *dryas*, Thomas, 1898, Ann. Mag. Nat. Hist. 7, II, p. 267.
Pallantanga, Ecuador. (Status *fide* Osgood.)

140. ORYZOMYS MINUTUS AURILLUS, Thomas
1917. Smiths. Misc. Coll. LXVIII, p. 1.
Torontoy, Cuzco district, Central Peru.

141. ORYZOMYS MINUTUS ALTISSIMUS, Osgood
1933. Field Mus. Nat. Hist. Publ. Zool. ser. XX, p. 5.
La Quinua, mountains north of Cerro de Pasco, Peru.

142. ORYZOMYS MINUTUS HUMILIOR, Thomas
1898. Ann. Mag. Nat. Hist. 7, II, p. 268.
Bogota region, Central Colombia.

Subgenus *Melanomys*, Thomas

(Forms occurring north of Panama, revised by Goldman, 1918, North Amer. Fauna, no. 43. See also Allen, Bull. Amer. Mus. Nat. Hist., XXXII, p. 533, 1913.)

143. ORYZOMYS AFFINIS AFFINIS, Allen
1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 88.
San José, Cauca district, W. Colombia.

144. ORYZOMYS AFFINIS MONTICOLA, Allen
1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 540.
Gallera, Cauca district, W. Colombia.

145. ORYZOMYS BUENAVISTAE, Allen
1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 547.
Buenavista, E. Colombia.

146. ORYZOMYS CALIGINOSUS CALIGINOSUS, Tomes
1860. Proc. Zool. Soc. London, p. 263.
Esmeraldas, W. Ecuador.

147. ORYZOMYS CALIGINOSUS CHRYSOMELAS, Allen
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 37.
Suerre, Costa Rica.

148. ORYZOMYS CALIGINOSUS IDONEUS, Goldman
1912. Smiths. Misc. Coll. LVI, 36, p. 5.
Cerro Azul, near headwaters of Chagres River, Panama.

149. ORYZOMYS CALIGINOSUS OROENSIS, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 538.
Rio de Oro, Manavi Province, W. Ecuador.

150. ORYZOMYS COLUMBIANUS, Allen

1899. Bull. Amer. Mus. Nat. Hist. XII, p. 203.
Manzanares, Santa Marta district, N.-E. Colombia.

151. ORYZOMYS LOMITENSIS, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 545.
Las Lomitas, W. Colombia.

152. ORYZOMYS OBSCURIOR, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 356.
Concordia, Medellin, Antioquia district, Colombia.

153. ORYZOMYS PHAEOPUS PHAEOPUS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 355.
Pallatanga, Central Ecuador.

154. ORYZOMYS PHAEOPUS OLIVINUS, Thomas

1902. Ann. Mag. Nat. Hist. 7, X, p. 247.
Zaruma, S.-E. Ecuador.

155. ORYZOMYS PHAEOPUS TOLIMENSIS, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 544.
Rio Toché, Tolima district, Colombia.

156. ORYZOMYS PHAEOPUS VALLICOLA, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 544.
Rio Frio, Cauca district, Central Colombia.

157. ORYZOMYS ROBUSTULUS, Thomas

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 243.
Gualaquiza, Ecuador.

Subgenus *Oecomys*, Thomas

158. ORYZOMYS BENEVOLENS, Thomas

1901. Ann. Mag. Nat. Hist. 7, VII, p. 369.
Chirimote, N. Bolivia.

159. ORYZOMYS BICOLOR, Tomes

1860. Proc. Zool. Soc. London, p. 217.
Guayaquil, S.-W. Ecuador.
Synonym: *dryas*, Thomas, 1900, Ann. Mag. Nat. Hist. 7, V, p. 271.

160. ORYZOMYS CATHERINAE, Thomas

1909. Ann. Mag. Nat. Hist. 8, IV, p. 234.
Joinville, Santa Catherina, S.-E. Brazil.

161. ORYZOMYS CAICARAE, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 603.
Caicara, Rio Orinoco, Central Venezuela.

162. ORYZOMYS EMILIAE, Allen
1916. Bull. Amer. Mus. Nat. Hist. XXXV, p. 525.
Rio Mojú, Pará, N.-E. Brazil.

163. ORYZOMYS ENDERSI, Goldman
1933. Journ. Washington Acad. Sci. XXIII, p. 525.
Barro Colorado Island, Canal Zone, Panama.

164. ORYZOMYS FLORENCIAE, Allen
1916. Bull. Amer. Mus. Nat. Hist. XXXV, p. 524.
Florencia, Rio Caqueta, E. Colombia.

165. ORYZOMYS GUIANAE, Thomas
1910. Ann. Mag. Nat. Hist. 8, VI, p. 187.
Rio Supinaam, Demerara district, British Guiana.

166. ORYZOMYS ILLECTUS, Bangs
1898. Proc. Biol. Soc. Washington, XII, p. 164.
Pueblo Vieijo, Sierra Nevada de Santa Marta, Colombia.

167. ORYZOMYS MAMORAE, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 445.
Mosetenes, Upper Rio Mamore, N.-E. Bolivia.

168. ORYZOMYS MARMOSURUS, Thomas
1899. Ann. Mag. Nat. Hist. 7, IV, p. 378.
Maipures, Upper Rio Orinoco, S.-W. Venezuela.

169. ORYZOMYS MELLEUS, Anthony
1924. Amer. Mus. Nov. 139, p. 4.
Zamora, S.-E. Ecuador.

170. ORYZOMYS MILLERI, Allen
1916. Bull. Amer. Mus. Nat. Hist. XXXV, p. 523.
Barao de Malgaço, Matto Grosso, S. Brazil.

171. ORYZOMYS MINCAE, Allen
1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 603.
Minca, Santa Marta district, N.-E. Colombia.

172. ORYZOMYS NITEDULUS, Thomas
1910. Ann. Mag. Nat. Hist. 8, VI, p. 505.
Lower Rio Essequibo, Demerara district, British Guiana.

173. ORYZOMYS OSGOODI, Thomas
1924. Ann. Mag. Nat. Hist. 9, XIV, p. 287.
Moyobamba, N. Peru.

174. ORYZOMYS PARICOLA, Thomas
1904. Ann. Mag. Nat. Hist. 7, XIV, p. 194.
Igarapé-Assu, Pará, N.-E. Brazil.

175. ORYZOMYS PHAEOTIS, Thomas
1901. Ann. Mag. Nat. Hist. 7, VII, p. 181.
Segrario, Rio Inambari, S.-E. Peru.

176. ORYZOMYS ROBERTI, Thomas
1903. Proc. Zool. Soc. London, II, p. 237.
Santa Anna de Chapada, Matto Grosso, Brazil.

177. ORYZOMYS REX, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 504.
Rio Supinaam, Demerara district, British Guiana.

178. ORYZOMYS ROSILLA, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIV, p. 35.
La Union, Lower Rio Orinoco, E. Venezuela.

179. ORYZOMYS RUTILUS, Anthony

1921. Amer. Mus. Nov. 19, p. 4.
Kartabo, British Guiana.

180. ORYZOMYS SUPERANS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 250.
Canelos, Rio Bobonaza, E. Ecuador.
Synonym: *palmeri*, Thomas, Ann. Mag. Nat. Hist. 8, VIII, 1911, p. 251. Canelos, Rio Bobonaza, Ecuador.

181. ORYZOMYS TAPAJINUS, Thomas

1909. Ann. Mag. Nat. Hist. 7, IV, p. 378.
Santa Rosa, Rio Jamauchim, Central Brazil.

182. ORYZOMYS TRABEATUS, Allen & Barbour

1923. Bull. Mus. Comp. Zool. Harvard Coll. LXV, p. 262.
Rio Jesusito, E. Panama.

Subgenus *Nesoryzomys*, Heller

183. ORYZOMYS DARWINI, Osgood

1929. Field Mus. Nat. Hist. Zool. ser. XVII, 2, p. 23.
Indefatigable Island, Academy Bay, Galapagos Islands.

184. ORYZOMYS INDEFESSUS, Thomas

1899. Ann. Mag. Nat. Hist. 7, IV, p. 280.
Indefatigable Island, Academy Bay, Galapagos Islands.

185. ORYZOMYS NARBOROUGHI, Heller

1904. Proc. Cal. Acad. Sci, III, p. 242.
Narborough Island, Mangrose Point, Galapagos Islands.

incertae sedis

186. ORYZOMYS SIMPLEX, Winge

1888. E. Museo Lundii, Bd. 1, 3, p. 11.
Lapa de Escrivania, Minas Geraes, Brazil.

Genus 2. MEGALOMYS, Trouessart

1881. MEGALOMYS, Trouessart, Le Naturaliste, vol. 1, p. 357.

1903. MOSCHOMYS, Trouessart, Ann. Mag. Nat. Hist. 7, XI, p. 388. (To replace *Megalomys*, under the impression that it was preoccupied by *Megamys*, Laurrilard, 1848.) See Miller, N.A. Recent Mammals, p. 365, 1923. (Preoccupied.)

1904. MOSCHOPHOROMYS, Elliot, Field Columb. Mus. Pub. 90, z.s. 3, p. 270. (To replace *Moschomys*, Trouessart.)

TYPE SPECIES.—*Mus pilorides*, Desmarest (not of Pallas).

RANGE.—Martinique, and St. Lucia, Lesser Antilles. The genus is now thought to be extinct.

Number of Forms.—Two.

Characters.—Skull with much narrowed braincase, little interorbital constriction in adult, and extremely powerfully ridged supraorbital region, the ridges extending back to the supraoccipital; occipital region upstanding, powerfully ridged. Zygomatic plate very slightly cut back above. Incisive foramina short, considerably in front of toothrows. Palate as *Oryzomys*. Bullae extremely small. Molars of *Oryzomys* type.

Size very large, much larger than any *Oryzomys*, though perhaps not more so than large forms of *Tylomys*; ear relatively small; tail long, moderately haired; feet not specialized; claws prominent.

Very few specimens seen. Forsyth Major considered this genus was not distinguishable from *Oryzomys*, and it seems to be very poorly differentiated from that genus; but it is retained as a valid genus by Miller, North American Recent Mammals.

Forms seen: *desmarestii*, *luciae*.

List of Named Forms

1. MEGALOMYS DESMARESTII, Fischer

1829. Synopsis Mamm. p. 316.
Martinique, Lesser Antilles.

2. MEGALOMYS LUCIAE, Forsyth Major

1901. Ann. Mag. Nat. Hist. 7, VII, p. 206.
St. Lucia, Lesser Antilles.

Genus 3. NEACOMYS, Thomas

1900. Neacomys, Thomas, Ann. Mag. Nat. Hist. 7, V, p. 153.

Type Species.—*Hesperomys* (*Calomys*) *spinosus*, Thomas.

Range.—Panama, British Guiana, Colombia, Peru, Southern Brazil. Extends to East Ecuador.

Number of Forms.—Six.

Characters.—Skull small, but apparently always with well-developed supraorbital ridges. Zygomatic plate nearly straight anteriorly. Palate as *Oryzomys*, with well-marked lateral pits. Incisive foramina usually not approaching toothrows. Bullae small. Interparietal well developed. Dentition very much as in *Oligoryzomys*. *N. guianae* must be noted as a very small form with rather reduced toothrow.

Externally peculiar in the fact that the fur of the back is composed of spines or bristles. Tail subequal in length to head and body, not well haired. Outer digits of hindfoot considerably shorter than the central three.

The main distinction between *Oryzomys* and this genus is the spiny fur in the present genus, perhaps scarcely a valid character if one takes into account the variability which may be found in this character within genera of Murinae, but evidently quite unique in the present subfamily.

Forms seen: *guianae*, *amoenus*, *spinosus*.

List of Named Forms

1. NEACOMYS GUIANAE, Thomas
1905. Ann. Mag. Nat. Hist. 7, XVI, p. 310.
Demerara River, British Guiana.

2. NEACOMYS PICTUS, Goldman
1912. Smiths. Misc. Coll. LX, 2, p. 6.
Cana, mountains of E. Panama.

3. NEACOMYS PUSILLUS, Allen
1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 81.
San José, Cauca district, W. Colombia.

4. NEACOMYS SPINOSUS SPINOSUS, Thomas
1882. Proc. Zool. Soc. London, p. 105.
Huambo, N. Peru.

5. NEACOMYS SPINOSUS AMOENUS, Thomas
1903. Proc. Zool. Soc. London, ii, p. 239.
Santa Anna de Chapada, Matto Grosso, S. Brazil.

6. NEACOMYS SPINOSUS TENUIPES, Thomas
1900. Ann. Mag. Nat. Hist. 7, V, p. 153.
Guaquimay, Bogota region, Colombia.

Genus 4. NECTOMYS, Peters

1861. Nectomys, Peters, Abhandl. k. Preuss. Akad. Wiss. Berlin, 1860, p. 151.
1897. Sigmodontomys, Allen, Bull. Amer. Mus. Nat. Hist. IX, p. 38. (*Sigmodontomys alfari*, Allen.)

Type Species.—*Mus squamipes*, Brants.

Range.—Nicaragua, Costa Rica, Panama; Ecuador, Colombia, Peru, British Guiana, Trinidad, Southern Brazil, Paraguay.

Number of Forms.—About seventeen.

Characters.—Skull with supraorbital ridges evidently always developed, usually extending over parietals, but not heavy on that area. Interparietal well developed. Nasals often tending to narrow to a point posteriorly and to extend somewhat behind the premaxillo-maxillary suture. Jugal short and reduced. Incisive foramina usually broad, extending to toothrow, but short and reduced in the species *esmeraldorum* and *russulus*, which probably would form a specific group (see note on external characters below).

Palate with large lateral pits, and about as *Oryzomys* posteriorly. Bullae relatively small. Coronoid process well developed.

Upper cheekteeth originally as *Oryzomys*, but cusps not well marked even when cutting, and the molars tend to become flatcrowned, with the outer folds isolated on crown surface. Clear traces of the subsidiary ridges always present. The molars are more hypsodont than *Oryzomys*, and are clearly distinct from the majority in pattern, though they may be approached by the subgenus *Melanomys*.

In old age, M.3 has all folds suppressed; M.1 has two, and M.2 has one inner fold more or less persistent; M.1 has four outer isolated narrow islands, the first and the third shorter than the others; M.2 like M.1 in this respect except that the anterior fold tends to wear out so that only three are left; pattern long preserved. Lower cheekteeth originally not far removed from the *Oryzomys* type, but repeating the peculiarities of the upper series; the outer folds more persistent, two on M.1, one on other teeth; inner folds isolating; usually four in M.1, two on other teeth, though M.2 may have three, one of which tends to disappear.

Fur usually soft; size typically large, up to 290 mm. head and body; external form slightly modified for aquatic life in more specialized species; hindfoot with the three centre digits long, the outer toes shorter; toes often partly webbed; tail long, not reduced, moderately or poorly haired, sometimes with a weak swimming-fringe developed.

Hindclaws frequently prominent; forefoot smaller than hindfoot. Feet least modified, on those seen, in the small species *esmeraldorum*, and according to Goldman in *alfari*, type of Allen's genus "*Sigmodontomys*" (for status of which see Goldman, Proc. Biol. Soc. Washington, XXIX, 1916, p. 127). Goldman notes that in this species, the plantar pads may vary from five to six individually, or even there may be six present on one foot, five on the other.

N. dimidiatus must be noted as an unusually small form. *N. hammondi* does not appear to be at all typical of the genus dentally, and may belong elsewhere; the cusps appear to show no tendency to become suppressed. "*Oryzomys*" *intectus* probably belongs to this genus.

Forms seen: *apicalis*, *dimidiatus*, *esmeraldorum*, *fulvinus*, *garleppi*, *grandis*, *hammondi*, *melanius*, *magdalenae*, *mattensis*, *palmipes*, *russulus*, *saturatus*.

List of Named Forms

1. NECTOMYS ALFARI ALFARI, Allen

1897. Bull. Amer. Mus. Nat. Hist. IX, p. 38.
Jimenez, Costa Rica.
Synonym: *ochraceus*, Allen, 1908, Bull. Amer. Mus. Nat. Hist. XXIV, p. 655. Nicaragua.

2. NECTOMYS ALFARI EFFICAX, Goldman

1913. Smiths. Misc. Coll. LX, no. 22, p. 7.
Cana, E. Panama.

3. NECTOMYS APICALIS, Peters

1861. Abhandl. K. Preuss. Akad. Wiss. Berlin, 1860, p. 152.
Guayaquil, S.-W. Ecuador.

4. NECTOMYS DIMIDIATUS, Thomas

1905. Ann. Mag. Nat. Hist. 7, XV, p. 586.
Escondido River, 7 miles below Rama, Nicaragua.

5. NECTOMYS ESMERALDORUM, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 250.
San Janvier, N.-W. Ecuador.

6. NECTOMYS FULVINUS, Thomas

1897. Ann. Mag. Nat. Hist. 6, XIX, p. 499.
Quitos, W. Ecuador.

7. NECTOMYS GARLEPPII, Thomas

1899. Ann. Mag. Nat. Hist. 7, III, p. 41.
Ocabamba Valley, Cuzco district, Central Peru.

8. NECTOMYS GRANDIS, Thomas

1897. Ann. Mag. Nat. Hist. 6, XIX, p. 498.
Concordia, Medellin, Antioquia district, Colombia.

9. NECTOMYS HAMMONDI, Thomas

1913. Ann. Mag. Nat. Hist. 8, XII, p. 570.
Mindo, W. Ecuador.

10. NECTOMYS MAGDALENAE, Thomas

1897. Ann. Mag. Nat. Hist. 6, XIX, p. 499.
Rio Magdalena, Cundinamarca district, W. Colombia.

11. NECTOMYS PALMIPES, Allen & Chapman

1893. Bull. Amer. Mus. Nat. Hist. V, p. 209.
Princestown, Trinidad.

12. NECTOMYS RUSSULUS, Thomas

1897. Ann. Mag. Nat. Hist. 6, XX, p. 547.
Valdivia, Cauca district, W. Colombia.

13. NECTOMYS SATURATUS, Thomas

1897. Ann. Mag. Nat. Hist. 6, XX, p. 546.
Ibarra, N. Ecuador.

14. NECTOMYS SQUAMIPES SQUAMIPES, Brants

1827. Het geslacht der Muizen, p. 138.
São Paulo Province, S. Brazil.
Synonym: *aquaticus*, Lund, 1841, K. Danske Vidensk. Selsk. Afhandl. VIII, p. 294. Rio Grande do Sul.
robustus, Burmeister, 1854, Syst. Ueb. Thiere. Brasiliens, 1, p. 164.

15. NECTOMYS SQUAMIPES MATTENSIS, Thomas

1903. Proc. Zool. Soc. London, ii, p. 238.
Santa Anna de Chapada, Matto Grosso, S. Brazil.

16. NECTOMYS SQUAMIPES MELANIUS, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 185.
Rio Essequibo, Demerara district, British Guiana.

17. NECTOMYS SQUAMIPES POLLENS, Hollister

1914. Proc. Biol. Soc. Washington, XXVII, p. 104.
Sapucay, Paraguay.

Genus 5. RHIPIDOMYS, Tschudi

1844. RHIPIDOMYS, Tschudi, Unters. u. d. Fauna Peruana, 1, p. 183.

TYPE SPECIES.—*Hesperomys leucodactylus*, Tschudi.

RANGE.—Panama, Colombia, Ecuador, Peru, Bolivia, North Argentina (Jujuy), Eastern Brazil, British Guiana, Venezuela, Trinidad.

Number of Forms.—Thirty-four.

Characters.—Supraorbital ridges present or absent but when present not very strong; parietals may be weakly ridged, but never extremely so. Interparietal very large. Zygomatic plate relatively narrow, straight anteriorly. Incisive foramina well open, extending to toothrows. Palate short, not quite reaching posterior part of toothrows, the lateral pits not well marked, or vestigial. Bullae small. Cheekteeth much as in *Oryzomys*. M.1 may have the anterointernal cusp a little reduced, but never as in *Phaenomys* or *Nyctomys*. Coronoid process not reduced. Mammae 1—2=6. Feet broad, large, arboreal, with large claws and long fifth digit to hindfoot; but hallux clawed and not fully opposable (at least as compared with specialized Indo-Malayan arboreal Murinae). Tail longer than head and body normally, well haired, tufted terminally. Rather large; usually over 100 head and body; *R. rex* is over 200.

Forms seen: *austrinus*, *bovalli*, *callinus*, *cearanus*, *couesi*, *cumaneus*, *equatoris*, *fulviventer*, *furvidus*, *goodfellowi*, *latimanus*, *leucodactylus*, *lucullus*, *macrurus*, *microtis*, *modicus*, *nitela*, *ochrogaster*, *pictor*, *rex*, *sclateri*, *venezuelae*, *venustus*.

(All the forms in London seem very closely allied, and I should not be surprised if in a revision all were considered as races of one or perhaps two species.)

List of Named Forms

1. RHIPIDOMYS AUSTRINUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VII, p. 183.
Sunchal, Sierra de Santa Barbara, Jujuy, N.-W. Argentina.

2. RHIPIDOMYS BOVALLII, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 114.
Potaro Highlands, British Guiana.

3. RHIPIDOMYS CAUCENSIS, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 601.
Munchique, Cauca district, Colombia.

4. RHIPIDOMYS COCALENSIS, Allen

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 79.
Cocal, Cauca district, Colombia.

5. RHIPIDOMYS COLLINUS, Thomas

1925. Ann. Mag. Nat. Hist. 9, XV, p. 578.
Itan, Sierra Santa Rosa, S. Bolivia.

6. RHIPIDOMYS COUESI, Allen & Chapman

1893. Bull. Amer. Mus. Nat. Hist. V, p. 211.
Princestown, Trinidad.

7. RHIPIDOMYS EQUATORIS, Thomas

1915. Ann. Mag. Nat. Hist. 8, XVI, p. 312.
Santo Domingo, W. Ecuador.

8. RHIPIDOMYS FULVIVENTER FULVIVENTER, Thomas

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 304.
Aqua Dulce, Cundinamarca district, Colombia.

9. RHIPIDOMYS FULVIVENTER ELATTURUS, Osgood

1914. Field Mus. Nat. Hist. Zool. ser. X, 11, p. 140.
West of Paramo de Tarma, Upper Rio Tachira, W. Venezuela.

10. RHIPIDOMYS GOODFELLOWI, Thomas

1900. Ann. Mag. Nat. Hist. 7, V, p. 270.
Rio Napo, at mouth of Rio Coca, E. Ecuador.

11. RHIPIDOMYS KLAGESI, Allen

1904. Bull. Amer. Mus. Nat. Hist. XX, p. 327.
El Llagual, Central Venezuela.

12. RHIPIDOMYS LATIMANUS, Tomes

1860. Proc. Zool. Soc. London, p. 213.
Pallatanga, Central Ecuador.

13. RHIPIDOMYS LEUCODACTYLUS, Tschudi

1844. Unters. u. d. Fauna Peruana, 1, p. 183.
E. Peru.

14. RHIPIDOMYS LUCULLUS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 115.
Garita del Sol. Vitoc Valley, Upper Rio Perené, Peru.

15. RHIPIDOMYS MACRURUS, Gervais

1855. In Castelnau, Exp. Amer. Sud. vii, 1, p. 111.
Trixas, Brazil.

16. RHIPIDOMYS MASTACALIS, Lund

1841. K. Danske Vidensk. Selsk. Afhandl. VIII, p. 240.
Lagoa Santa, Rio des Velhas, S.-W. Minas Geraes, E. Brazil.

17. RHIPIDOMYS MICROTIS, Thomas

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 304.
Salina del Vatan, Cundinamarca district, Colombia.

18. RHIPIDOMYS MODICUS, Thomas

1926. Ann. Mag. Nat. Hist. 9, XVIII, p. 161.
Puca Tambo, Chachapoyas, N. Peru.

19. RHIPIDOMYS MOLLISSIMUS, Allen

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 78.
Mira Flores, Cauca district, Colombia.

20. RHIPIDOMYS OCHROGASTER, Allen

1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 43.
Inca Mines, Rio Inambari, S.-E. Peru.

21. RHIPIDOMYS PICTOR, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIV, p. 193.
Rio Verde, N.-W. Ecuador.

22. RHIPIDOMYS QUINDIANUS, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 600.
El Roble, Bogota district, Colombia.

23. RHIPIDOMYS REX, Thomas

1927. Ann. Mag. Nat. Hist. 9, XX, p. 600.
Chinchavita, Huanucu Province, Central Peru.

24. RHIPIDOMYS SCANDENS, Goldman

1913. Smiths. Misc. Coll. LX, no. 22, p. 8.
Near head of Rio Limon, Mt. Pirri, E. Panama.

25. RHIPIDOMYS SCLATERI, Thomas

1887. Proc. Zool. Soc. London, p. 152.
Maccasseema, Demerara district, British Guiana.

26. RHIPIDOMYS SIMILIS, Allen

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 79.
Cocal, Cauca district, Colombia.

27. RHIPIDOMYS VENEZUELAE VENEZUELAE, Thomas

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 303.
Merida, W. Venezuela.

28. RHIPIDOMYS VENEZUELAE CEARANUS, Thomas

1910. Ann. Mag. Nat. Hist. 8, VI, p. 501.
Sierra de Ibiapaba, Ceara Province, N.-E. Brazil.

29. RHIPIDOMYS VENEZUELAE CUMANANUS, Thomas

1900. Ann. Mag. Nat. Hist. 7, V, p. 271.
Ipure, Cumana district, Venezuela.

30. RHIPIDOMYS VENEZUELAE FERVIDUS, Thomas

1904. Ann. Mag. Nat. Hist. 7, XIV, p. 34.
La Union, Lower Rio Orinoco, E. Venezuela.

31. RHIPIDOMYS VENEZUELAE MILLERI, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 602.
Minehaha Creek, Lower Rio Essequibo, Demerara district, British Guiana.

32. RHIPIDOMYS VENEZUELAE NITELA, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 148.
Kwaimatta, Kanuku Mountains, British Guiana.

33. RHIPIDOMYS VENEZUELAE YURUANUS, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 601.
Rio Yuruan, E. Venezuela.

34. RHIPIDOMYS VENUSTUS, Thomas

1900. Ann. Mag. Nat. Hist. 7, V, p. 152.
Las Vegas del Chama, Merida, Venezuela.

Genus 6. THOMASOMYS, Coues

1884. THOMASOMYS, Coues, Amer. Naturalist, XVIII, p. 1275.
1898. AEPEOMYS, Thomas, Ann. Mag. Nat. Hist. 7, I, p. 452. (*Oryzomys lugens*, Thomas.)
1917. INOMYS, Thomas, Ann. Mag. Nat. Hist. 8, XX, p. 197. (*Oryzomys incanus*, Thomas.)
1900. ERIORYZOMYS, Bangs, Proc. New Engl. Club, 1, p. 96. (*Oryzomys monochromus*, Bangs.)
1917. DELOMYS, Thomas, Ann. Mag. Nat. Hist. 8, XX, p. 196. (*Hesperomys dorsalis*, Hensel.)

TYPE SPECIES.—*Hesperomys (Rhipidomys) cinereus*, Thomas.

RANGE.—British Guiana, Venezuela, Colombia, Ecuador, Peru, Bolivia, North Argentina, South-eastern Brazil.

NUMBER OF FORMS.—Fifty-one.

CHARACTERS.—Skull as a rule rather noticeably different from *Rhipidomys*, and in extreme forms becoming reminiscent of that of *Oxymycterus*. Rostrum long and pointed; braincase large and rounded (though less so than in forms like *Tylomys*), supraorbital ridges scarcely developed. Interorbital constriction well marked in forms like *gracilis*, and the large *T. aureus*, but scarcely marked at all in the *lugens* group; intermediate between the two types in forms like *ischyurus* and *incanus*. Zygomatic plate narrow, but strongly tilted upwards, thus differing from *Oxymycterus*; the anterior border is straight. Interparietal well developed. Palate as in *Rhipidomys*, short. Incisive foramina extending to the toothrows. Bullae medium or small except, of those seen, in *pyrrhonotus*, in which they are considerably enlarged. Cheekteeth of *Oryzomys* type; but in the *T. aureus* group, as here understood, the inner and outer folds are unusually broad and well marked, and give the pattern rather a different aspect from that of the typical forms. *T. pyrrhonotus* approaches this type of dentition. Lower teeth of usual type, except that the above-mentioned peculiarity is repeated in the *aureus* group.

Mammae 1—2=6 or may be 2—2=8 in *dorsalis* group (variable). Fur very thick and soft. Tail longer than head and body, normally moderately haired. Hindfoot usually not much modified for arboreal life, but in the *aureus* group it may become nearly as much so as in *Rhipidomys*, making it only possible to separate this genus from *Rhipidomys* on average characters, though I think both form natural groups. In *T. dorsalis* and allies there is a faint mid-dorsal stripe sometimes present, and the tail is poorly haired. The "genera" *Aepeomys* and *Inomys* have already been placed in synonymy by Osgood (1933, Journ. Mamm. Baltimore, 14, p. 161); so beyond saying that I fully agree with this classification nothing need be added. Nor can I find any difference of generic value between *Thomasomys* and "*Delomys*" (the *dorsalis* group); as a species group it is clearly distinct, but none of its characters are of generic value. The zygomatic plate is in this species cut back above (a character which may be present or absent in any large genus). *T. dorsalis* was referred to *Thomasomys* by Thomas when he indicated what species should be referred to it from *Oryzomys*, and in my opinion should never have been separated from it.

Forms seen: *aureus*, *baeops*, *cinereiventer*, *cinereus*, *collinus*, *daphne*, *dorsalis*, *eleusis*, *emeritus*, *fraternus*, *gracilis*, *hylophilus*, *incanus*, *ischyrus*, *kalinowskii*, *laniger*, *lugens*, *macconnelli*, *nicefori*, *niveipes*, *notatus*, *oenax*, *paramorum*, *popayanus*, *praetor*, *princeps*, *pyrrhonotus*, *rosalinda*, *rhoadsi*, *sublineatus*, *taczanowskii*, *vestitus*, *vulcani*.

In British Museum material, five quite well-marked groups are apparent:

aureus group: large forms, with feet more or less modified for arboreal life, and dentition as already indicated; includes *popayanus*, *praetor*, *princeps*, *nicefori*, and *aureus*.

pyrrhonotus group: like the last but with much enlarged bullae; includes, according to description, *auricularis*, as well as *pyrrhonotus*.

dorsalis group: moderate-sized species with the characters indicated above, and differing chiefly in the fact that the zygomatic plate is cut back above. Includes *sublineatus*, *dorsalis*.

lugens group: differing from the *cinereus* group in the almost complete absence of interorbital constriction, and *Oxymycterus*-like skull. There are, however, intermediate forms, and it may be that in a full revision this group would not stand. Includes *lugens*, *vulcani*, and according to description, *fuscatus*.

cinereus group: the other forms seen; with no special peculiarities. Forms unrepresented in London have been provisionally referred here.

List of Named Forms

aureus Group

1. THOMASOMYS AUREUS AUREUS, Tomes

1860. Proc. Zool. Soc. London, p. 219.
Pallantanga, Ecuador.

2. THOMASOMYS AUREUS ALTORUM, Allen

1914. Bull. Amer. Mus. Nat. Hist. XXXIII, p. 200.
Mt. Pichincha, W. Ecuador.

3. THOMASOMYS AUREUS POPAYANUS, Allen

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 81.
Popayan, Cauca district, Colombia.

4. THOMASOMYS NICEFORI, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 355.
San Pedro, Medellin, Antioquia district, Colombia.

5. THOMASOMYS PRAETOR, Thomas

1900. Ann. Mag. Nat. Hist. 7, V, p. 354.
San Pablo, Cajamarca district, N. Peru.

6. THOMASOMYS PRINCEPS, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 58.
Bogota region, Central Colombia.

pyrrhonotus Group

7. THOMASOMYS AURICULARIS, Anthony

1923. Amer. Mus. Nov. 55, p. 6.
Taraguacocha, Provincia del Oro, S. Ecuador.

8. THOMASOMYS PYRRHONOTUS, Thomas

1886. Ann. Mag. Nat. Hist. 5, XVIII, p. 421.
Tambillo, Rio Malleta, Cajamarca district, N. Peru.

dorsalis Group

9. THOMASOMYS DORSALIS DORSALIS, Hensel

1873. Abhandl. K. Preuss. Akad. Wiss. Berlin, 1872, p. 42.
Rio Grande do Sul Province, S. Brazil.

10. THOMASOMYS DORSALIS COLLINUS, Thomas
1917. Ann. Mag. Nat. Hist. 8, XX, p. 197.
Itatiaya, Rio de Janeiro Province, E. Brazil.

11. THOMASOMYS DORSALIS LECHEI, Trouessart
1904. Cat. Mamm. Suppl. p. 434.
Taquara de Mundo Nova, Rio Grande do Sul, E. Brazil. (Probably a synonym of *d. dorsalis*, according to Gyldenstolpe.)
Synonym: *obscura*, Leche, 1886, Zool. Jahrb. p. 696. Preoccupied.

12. THOMASOMYS SUBLINEATUS, Thomas
1903. Ann. Mag. Nat. Hist. 7, XII, p. 240.
Engenheiro Reeve, Espiritu Santo Province, E. Brazil.

lugens Group

13. THOMASOMYS FUSCATUS, Allen
1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 89.
San Antonio, Cuaca district, W. Colombia.

14. THOMASOMYS LUGENS, Thomas
1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 306.
La Loma del Morro, Merida, W. Venezuela.
Synonym: *ottleyi*, Anthony, 1932, Amer. Mus. Nov. 548, p. 1. Status *fide* Osgood.

15. THOMASOMYS VULCANI, Thomas
1898. Ann. Mag. Nat. Hist. 7, I, p. 452.
Mt. Pinchincha, W. Ecuador.

cinereus Group

16. THOMASOMYS BAEOPS, Thomas
1899. Ann. Mag. Nat. Hist. 7, III, p. 152.
Rio Pita, Chillo Valley, Ecuador.

17. THOMASOMYS BOMBYCINUS, Anthony
1925. Amer. Mus. Nov. no. 178, p. 1.
Paramillo, Antioquia district, Colombia.

18. THOMASOMYS CAUDIVARIUS, Anthony
1923. Amer. Mus. Nov. no. 55, p. 4.
Taraguacocha, Provincia del Oro, S. Ecuador.

19. THOMASOMYS CINEREIVENTER CINEREIVENTER, Allen
1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 80.
Popayan, Cuaca district, W. Colombia.

20. THOMASOMYS CINEREIVENTER CONTRADICTUS, Anthony
1925. Amer. Mus. Nov. no. 178, p. 3.
Santa Isabel, Quindio, Andes, Colombia.

21. THOMASOMYS CINEREIVENTER DISPAR, Anthony
1925. Amer. Mus. Nov. no. 178, p. 2.
Andalucia, Huila district, E. Colombia.

22. THOMASOMYS CINEREUS, Thomas
1882. Proc. Zool. Soc. London, p. 108.
Cutervo, Cajamarca district, N. Peru.

23. THOMASOMYS CINNAMEUS, Anthony

1924. Amer. Mus. Nov. 139, p. 5.
Hacienda San Francisco, Ambato, Central Ecuador.

24. THOMASOMYS DAPHNE DAPHNE, Thomas

1917. Smiths. Misc. Coll. LXVIII, no. 4, p. 2.
Ocabamba Valley, Cuzco district, Peru.

25. THOMASOMYS DAPHNE AUSTRALIS, Anthony

1925. Amer. Mus. Nov. 178, p. 4.
Icanchaca, Cochabamba district, Central Bolivia.

26. THOMASOMYS ERRO, Anthony

1926. Amer. Mus. Nov. 240, p. 5.
Mt. Sumaco, Ecuador.

27. THOMASOMYS GRACILIS, Thomas

1917. Smiths. Misc. Coll. LXVIII, no. 4, p. 2.
Machu Picchu, Cuzco district, Peru.

28. THOMASOMYS HUDSONI, Anthony

1923. Amer. Mus. Nov. 55, p. 3.
Bestion, Provincia del Azuay, S.-E. Ecuador.

29. THOMASOMYS HYLOPHILUS, Osgood

1912. Field Mus. Nat. Hist. Zool. ser. X, no. 5, p. 50.
Paramo de Tama, Upper Rio Tachira, Santander district, Colombia.

30. THOMASOMYS INCANUS INCANUS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 350.
Vitoc Valley, Central Peru.

31. THOMASOMYS INCANUS FRATERNUS, Thomas

1927. Ann. Mag. Nat. Hist. 9, XX, p. 602.
Alcas, north-east of Cerro, Junin Province, Central Peru.

32. THOMASOMYS ISCHYRUS ISCHYRUS, Osgood

1914. Field Mus. Nat. Hist. Zool. ser. X, no. 12, p. 162.
Tambo Almirante, Uchco, Peru.

33. THOMASOMYS ISCHYRUS ELEUSIS, Thomas

1926. Ann. Mag. Nat. Hist. 9, XVII, p. 614.
Tambo Jenes, east of Balsas, Cajamarca district, N. Peru.

34. THOMASOMYS KALINOWSKII, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 349.
Vitoc Valley, Central Peru.

35. THOMASOMYS LADEWI, Anthony

1926. Amer. Mus. Nov. no. 239, p. 1.
Rio Aceramarca, La Paz Province, Bolivia

36. THOMASOMYS LANIGER LANIGER, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 59.
Bogota region, Colombia.

37. THOMASOMYS LANIGER EMERITUS, Thomas

1916. Ann. Mag. Nat. Hist. 8, XVIII, p. 479.
Montes de Escaguer, Merida, Venezuela.

38. THOMASOMYS MACCONNELLI, de Winton
1900. Trans. Linn. Soc. London, VIII, p. 52.
Mt. Roraima, British Guiana.

39. THOMASOMYS MONOCHROMOS, Bangs
1900. Proc. New Engl. Club, 1, p. 97.
Macotona, Sierra Nevada de Santa Marta, N.-E. Colombia.

40. THOMASOMYS NIVEIPES, Thomas
1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 305.
La Oya del Barro, Cundinamarca district, Colombia.

41. THOMASOMYS NOTATUS, Thomas
1917. Smiths. Misc. Coll. LXVIII, 4, p. 2.
Torontoy, Cuzco district, Central Peru.

42. THOMASOMYS OENAX, Thomas
1928. Ann. Mag. Nat. Hist. 10, I, p. 154.
San Lorenzo, Rio Grande do Sul, S. Brazil.

43. THOMASOMYS OREAS, Anthony
1926. Amer. Mus. Nov. 239, p. 2.
Cocopunco, La Paz Province, Bolivia.

44. THOMASOMYS PARAMORUM, Thomas
1898. Ann. Mag. Nat. Hist. 7, I, p. 453.
Paramo, south of Mt. Chimborazo, Ecuador.

45. THOMASOMYS PICTIPES, Osgood
1933. Field Mus. Nat. Hist. Publ. Zool. ser. XX, no. 2, p. 11.
Caraguatay, Rio Parana, 100 miles south of Rio Iguassu, Misiones, Argentina.

46. THOMASOMYS ROSALINDA, Thomas & St. Leger
1926. Ann. Mag. Nat. Hist. 9, XVIII, p. 347.
Goncha, Peruvian Amazonas, N. Peru.

47. THOMASOMYS RHOADSI RHOADSI, Stone
1914. Proc. Acad. Nat. Sci. Philadelphia, LXVI, p. 12.
Hacienda Garzon, Mt. Pichincha, Ecuador.

48. THOMASOMYS RHOADSI FUMEUS, Anthony
1924. Amer. Mus. Nov. 139, p. 6.
Hacienda San Francisco, Ambato, Central Ecuador.

49. THOMASOMYS SILVESTRIS, Anthony
1924. Amer. Mus. Nov. 114, p. 2.
Las Maquinas, west of Mt. Corazon, W. Ecuador.

50. THOMASOMYS TACZANOWSKII, Thomas
1882. Proc. Zool. Soc. London, p. 109.
Tambillo, Rio Malleta, Cajamarca district, Peru.

51. THOMASOMYS VESTITUS, Thomas
1898. Ann. Mag. Nat. Hist. 7, I, p. 454.
Rio Milla, Merida, W. Venezuela.

Genus 7. PHAENOMYS, Thomas

1917. Phaenomys, Thomas, Ann. Mag. Nat. Hist. 8, XX, p. 196.

TYPE SPECIES.—*Oryzomys ferrugineus*, Thomas.

RANGE.—Described from Rio de Janeiro, East Brazil.

NUMBER OF FORMS.—One.

CHARACTERS.—(Two broken skulls, both lacking bullae, available for examination only.) Posterior palate as in *Thomasomys*. Zygomatic plate straight anteriorly. Palatal foramina broad, almost extending to toothrow. Supraorbital ridges well developed. Braincase narrower than in *Nyctomys*, and frontals much narrower than in that genus. Anterointernal cusp of M.1 strongly reduced, about as in *Nyctomys*. General dental characters otherwise as in *Oryzomys*.

Tail very long, relatively well haired; hindfoot slightly modified for arboreal life. Mammae 2—2 = 8. Colour light red.

A little-known form, the status of which is not clear, but which may probably be given generic rank.

Forms seen: *ferrugineus*.

LIST OF NAMED FORMS

1 PHAENOMYS FERRUGINEUS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 352.
Rio de Janeiro, E. Brazil.

Genus 8. CHILOMYS, Thomas

1897. CHILOMYS, Thomas, Ann. Mag. Nat. Hist. 6, XIX, p. 500.

TYPE SPECIES.—*Oryzomys instans*, Thomas.

RANGE.—Colombia.

NUMBER OF FORMS.—Two are named.

CHARACTERS.—Differing from *Oryzomys* in the following characters: braincase extremely heavy, large and rounded, but skull without supraorbital or parietal ridges. Rostrum narrowed. Upper incisors pro-odont; lower incisors compressed. Anterior zygomatic plate is straight, and M.3 is evidently rather reduced (one skull seen only).

Externally with no special peculiarities: Mouselike, with soft fur, and long tail.

Forms seen: *instans*.

LIST OF NAMED FORMS

1. CHILOMYS FUMEUS, Osgood

1912. Field Mus. Nat. Hist. Publ. Zool. ser. X, no. 5, p. 53.
Paramo de Tama, Upper Rio Tachira, Santander district, E. Colombia.
(Considered a synonym of *instans* by Gyldenstolpe.)

2. CHILOMYS INSTANS, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 368.
La Selva Estate, Bogota region, Central Colombia.

Genus 9. TYLOMYS, Peters

1866. Tylomys, Peters, Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 404.

Type Species.—*Hesperomys* (*Tylomys*) *nudicaudus*, Peters.

Range.—Known from Mexico, Guatemala, Panama, and Ecuador.

Number of Forms.—Seven.

Characters.—Skull in all essential characters similar to *Nyctomys* (below), but very much larger; highly specialized, and with supraorbital ridges extremely powerful. Incisive foramina very broad, but narrowed anteriorly. Occipital region prominently ridged, but low. Mandible with coronoid process not reduced; the back of the jaw more or less flattened.

Upper cheekteeth of *Oryzomys* type, but the subsidiary ridges in the main outer folds, though clearly marked, do not extend to the outer border of the crown. M.3 appears to be essentially as M.2 in elements.

Lower cheekteeth of *Oryzomys* type; very complex; M.3 scarcely reduced, and almost exactly as in M.2.

Size large; up to 228 mm. head and body in B.M. material; tail subequal in length to head and body; almost completely naked. Hindfoot considerably specialized for arboreal life, as in *Rhipidomys*, *Ototylomys*, and *Nyctomys*.

The specialized skull, which is characteristic of many arboreal Rodents, distinguishes this genus from more generalized types as *Rhipidomys*.

Forms seen: *mirae*, *nudicaudus*, *panamensis*, *watsoni*.

List of Named Forms

1. TYLOMYS BULLARIS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 561.
Tuxtla, Chiapas, Mexico.

2. TYLOMYS FULVIVENTER, Anthony

1916. Bull. Amer. Mus. Nat. Hist. XXXV, p. 366.
Tacarcuna, district of Darien, Panama.

3. TYLOMYS MIRAE, Thomas

1899. Ann. Mag. Nat. Hist. 7, IV, p. 278.
Paramba, Rio Mira, N.-W. Ecuador.

4. TYLOMYS NUDICAUDUS, Peters

1866. Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 404.
Guatemala.

5. TYLOMYS PANAMENSIS, Gray

1873. Ann. Mag. Nat. Hist. 4, XII, p. 417.
Panama.

6. TYLOMYS TUMBALENSIS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 560.
Tumbala, Chiapas, Mexico.

7. TYLOMYS WATSONI, Thomas

1899. Ann. Mag. Nat. Hist. 7, IV, p. 278.
Bogava, Chiriqui, Panama.

Genus 10. OTOTYLOMYS, Merriam

1901. OTOTYLOMYS, Merriam, Proc. Washington Acad. Sci. III, p. 561.

TYPE SPECIES.—*Ototylomys phyllotis*, Merriam.

RANGE.—Central America: Mexico, Guatemala, Nicaragua, Costa Rica.

NUMBER OF FORMS.—Six.

CHARACTERS.—(Few forms seen; these notes based on *guatemalae* and the type.) Skull like *Tylomys*, but much smaller; incisive foramina not narrowed anteriorly; bullae inflated and enlarged. Coronoid process reduced, and mandible less flattened posteriorly. Molars evidently differing somewhat from other *Oryzomys* genera. Cusps more symmetrical than is usual, in upper molars, the folds of the teeth strictly opposite, very deep and wide, nearly meeting in middle of teeth; each pair of cusps with a deep more or less isolated pit separating them; M.3 exactly similar to M.2 in elements; each of these teeth with only one inner and one outer main fold; the subsidiary ridges in the main folds of the upper molars considerably reduced; the cheekteeth broad. Lower molars repeating the peculiarities of the upper series; pits well marked; inner cusps rather high; M.3 relatively large.

Essential external characters, other than considerably smaller size, as in *Tylomys*. The palate is short posteriorly, as in *Rhipidomys*.

Forms seen: *guatemalae*, *phyllotis*.

LIST OF NAMED FORMS

1. OTOTYLOMYS CONNECTENS, Sanborn
1935. Field. Mus. Nat. Hist. Publ. Zool. ser. XX, p. 82.
Coban, Alta Verapaz, Guatemala.

2. OTOTYLOMYS FUMEUS, Allen
1908. Bull. Amer. Mus. Nat. Hist. XXIV, p. 658.
Matagalpa, Nicaragua.

3. OTOTYLOMYS GUATEMALAE, Thomas
1909. Abstr. Proc. Zool. Soc. London, p. 32; Proc. Zool. Soc. London, p. 670.
Tucuru, Polochic River, about 50 miles east of Coban, Guatemala.

4. OTOTYLOMYS PHYLLOTIS PHYLLOTIS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 562.
Tunkas, Yucatan, Mexico.

5. OTOTYLOMYS PHYLLOTIS AUSTRALIS, Osgood
1931. Field. Mus. Nat. Hist. Publ. Zool. ser. XVIII, p. 145.
San Geronimo, near Pozo, Azul de Pirris, Costa Rica.

6. OTOTYLOMYS PHYLLOTIS PHAEUS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 563.
Apazote, near Yohaltun, Campeche, Mexico.

Genus 11. NYCTOMYS, Saussure

1860. NYCTOMYS, Saussure, Rev. et. Mag. de Zool. ser. 2, vol. XII, p. 106.

Type Species.—*Hesperomys sumichrasti*, Saussure.

Range.—Central America; Mexico, Honduras, Guatemala, Nicaragua, Panama.

Number of Forms.—Five.

Characters.—Skull with extremely broad braincase, very broad frontals, supraorbital ridges powerful, and extending over the parietals to occiput; interparietal very broad and large, completely separating parietals from supraoccipital; rostrum short; zygomatic plate very narrow, straight anteriorly; infraorbital foramen well open. Bullae small. Palate broad, ending in front of posterior part of toothrow, and without lateral pits. Incisive foramina broad, but scarcely reaching toothrows. Cheekteeth of *Oryzomys* type, but extremely complex, reminiscent in general effect somewhat of complex-toothed Indo-Malay Squirrels. Anterointernal cusp of M.1 strongly reduced. Isolated islands between each pair of cusps well marked. Lower molars evidently with pattern preserved longer than *Oryzomys*, and extremely complex; M.3 large. Coronoid process low.

Mammae 4. Hindfoot considerably modified for arboreal life, in formation like that of *Rhipidomys*. Tail well haired, and tufted terminally. In both this genus and *Rhipidomys*, the pad representing the pollex may be prominent. The hallux in *Nyctomys* is clawed.

Forms seen: *nitellinus*, *salvini*, *sumichrasti*.

List of Named Forms

1. NYCTOMYS SUMICHRASTI SUMICHRASTI, Saussure

1860. Rev. et. Mag. Zool. ser. 2, XII, p. 107.
Eastern slopes of mountains in Vera Cruz, Mexico.

2. NYCTOMYS SUMICHRASTI DECOLORUS, True

1894. Proc. U.S. Nat. Mus. XVI, 1893, p. 689.
Rio de las Piedras, Honduras.

3. NYCTOMYS SUMICHRASTI NITELLINUS, Bangs

1902. Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 30.
Boquete, Chiriqui, Panama.

4. NYCTOMYS SUMICHRASTI SALVINI, Tomes

1861. Proc. Zool. Soc. London, p. 284.
Dueñas, Guatemala.

5. NYCTOMYS SUMICHRASTI VENUSTULUS, Goldman

1916. Proc. Biol. Soc. Washington, XXIX, p. 155.
Greytown, Nicaragua.

Genus 12. NESOMYS, Peters

1870. Nesomys, Peters, Sitz. Ber. Ges. Nat. Fr. Berlin, p. 54.
1879. Hallomys, Jentink, Notes Leyden Mus. 1, p. 107. (*Hallomys audeberti*, Jentink.)
(Not seen. Status *fide* Forsyth Major.)

Type Species.—*Nesomys rufus*, Peters.

RANGE.—Madagascar.

NUMBER OF FORMS.—Three.

CHARACTERS.—Skull with relatively wide and unridged frontals, interparietal large, rostrum long. Jugal long; infraorbital foramen well open; zygomatic plate relatively low. Palate extending behind M.3, and broad. Bullae comparatively large. Incisive foramina well open, broader posteriorly, but not reaching toothrow.

Upper cheekteeth complex, though evidently more simplified than in *Oryzomys*; not flatcrowned, but cusps relatively low. M.1 with two main outer, one main inner folds, the inner fold extending right across tooth and joining the front outer fold. Isolated islands are present in front of each of the outer folds, and there is one behind the second outer fold. M.2 is similar in elements to M.1. M.1 appears to bear no trace of the anterointernal cusp, or its corresponding element, found in *Oryzomys* genera. What I take to correspond to the subsidiary ridges of the *Oryzomys* genera are present in the main folds of the upper molars. M.3 relatively reduced, with usually all its elements isolated as islands, but with traces of what appear to be four outer, one inner folds. The antero-external fold, usually strong in *Oryzomys* and allies, seems to be almost obliterated in this genus, and to disappear early. The main folds evidently do not isolate as islands. Lower teeth with a pattern rather specialized and definite for the present group, consisting of, in each tooth, one wide inner and outer fold, opposite to each other and retained, and in front of which and behind which respectively is a wide isolated island. There are also traces of extra anterior folds in M.1 and M.2. This type of lower molar can be matched by *Ototylomys*, though *Ototylomys* is much more complex in general effect; also by such non-Murine genera as *Erethizon*, *Funisciurus*, and *Anomalurops*. Four totally unrelated genera appear therefore to be undergoing similar dental specialization. It is the most highly specialized form of dentition (apparently) known in the Sciuridae, and the least specialized known in the Hystricoidae.

Hindfoot rather long, with the three centre digits considerably longer than the outer pair. Tail long, moderately haired, sometimes slightly tufted. Large; over 200 mm. head and body.

Forms seen: *rufus*.

"*Hallomys*" is regarded as a *Nesomys* by Forsyth Major. The original description indicates that the animal in question is a *Nesomys*.

LIST OF NAMED FORMS

1. NESOMYS RUFUS, Peters

1870. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 55.
Vohima, Madagascar.

2. NESOMYS LAMBERTONI, Grandidier

1928. Bull. Acad. Malgache, 11, p. 95.
Rogez, near Brickaville, E. Madagascar.

3. NESOMYS AUDEBERTI, Jentink

1879. Notes Leyden Mus. I, p. 107.
Maisine, N.-E. Madagascar.

Genus 13. RHAGOMYS, Thomas

1917. Rhagomys, Thomas, Ann. Mag. Nat. Hist. 8, XX, p. 192.

Type Species.—*Hesperomys rufescens*, Thomas.

Range.—Described from Rio de Janeiro, East Brazil.

Number of Forms.—One.

Characters.—Braincase evidently much broadened (two broken skulls seen only). Incisive foramina narrow, not approaching toothrows. Zygomatic plate nearly straight anteriorly. Upper cheekteeth simplified, with the subsidiary ridges evidently suppressed, and each cusp raised, the folds poorly marked, the cheekteeth might almost be described as flatcrowned, but with four (or six in M.1) raised corner projections. M.3 with posterior elements reduced, as in *Oryzomys*. Lower cheekteeth resembling the upper series in general pattern. M.1 (upper) is evidently three-rooted.

Mammae 1—2=6. Externally modified for arboreal life. The hallux in the type skin appears to lack a claw, but more specimens will be necessary before this character can be proved, as the skins examined are very old, and not in good condition. D.5 hindfoot lengthened; tail long, not well haired. Size small, about 94 mm. Lower incisor root forms noticeable process on outer side of mandible.

This is a little-known genus, and the characters given must be accepted as provisional.

Forms seen: *rufescens*.

List of Named Forms

1. RHAGOMYS RUFESCENS, Thomas

1886. Ann. Mag. Nat. Hist. 5, XVII, p. 250.
Rio de Janeiro, E. Brazil.

Genus 14. REITHRODONTOMYS, Giglioli

1874. Reithrodontomys, Giglioli, Bull. Soc. Geogr. Ital. Roma. 11, p. 326.
1874. Ochetodon, Coues, Proc. Acad. Nat. Sci. Philadelphia, p. 184.
1914. Aporodon, Howell, North Amer. Fauna, no. 36, p. 63. (*Reithrodontomys tenuirostris*, Merriam.) Valid as a subgenus.

Type Species.—*Mus humulis*, Audubon & Bachman.

Range.—U.S.A., extending south into northern South America. California, Lower California, Idaho, Arizona, Colorado, New Mexico, Nebraska, Kansas, Oklahoma, Texas, Louisiana, Florida, South Carolina, Virginia; Mexico, including Yucatan; Guatemala, Honduras, Costa Rica, Nicaragua, Panama; Colombia, Ecuador. For range maps see Howell, also Anthony, Field Book North American Mammals, 1928.

Number of Forms.—Sixty-five.

CHARACTERS.—Braincase rather inflated; skull with considerable interorbital constriction, and not developing supraorbital ridges. Palatal foramina reaching toothrows. Bullae rather small. Palate square posteriorly, terminating about on a level with last molars. Zygomatic plate narrow, not projected forwards above. Coronoid process low. Upper incisors strongly one-grooved. Upper cheekteeth of *Peromyscus*-type in the typical subgenus, with M.3 strongly reduced, M.1 with five cusps, and the re-entrant folds deep and curved (not tending to isolate as islands between the cusps), and with no subsidiary ridges present, though according to Howell they may be present in the *rufescens* group.

In the subgenus APORODON the molars are more *Oryzomys*-like, with M.3 not reduced, the cusps alternating less (at least in South American species), and well-marked subsidiary ridges are developed (less so in *chrysopsis* group, according to Howell). The lower incisors are plain; the lower molars normal, in the genus; the upper molars are three- or four-rooted (Howell).

There is a wide difference between the two extremes in this subgenus. But I have not seen the intermediate types.

Plantar pads 6. Mammae 6. No cheekpouches (Howell). Small, often very small forms; feet narrow; digits not abnormal, D.5 hindfoot often relatively long. Ear prominent. Tail about head and body length or sometimes considerably more, and moderately haired. Head and body usually under 100, but up to 107 in B.M. material.

Forms seen: *australis*, *creper*, "*costaricensis*," *cherriei*, *dychei*, *humulis*, *longicaudus*, *modestus*, *mexicanus*, "*pallidus*," *rufescens*, *saturatus*, *söderströmi*, *tenuis*.

The genus is revised by Howell, North Amer. Fauna, No. 36, 1914.

Eight groups are recognized, characterized as follows:

Subgenus APORODON

(with subsidiary ridges in main folds of upper molars present)

The first two groups differ from the others in having the outer wall of the anteorbital foramina relatively narrow, the interpterygoid broad, the palatal foramina short, and the tail unicolour, and the pelage dense.

The *mexicanus* group has the braincase not inflated and the rostrum short and broad;

The *tenuirostris* group differs from this in having the braincase inflated, and the rostrum long and narrow.

The other groups have, according to Howell's key, the outer wall of the anteorbital foramina broader, the interpterygoid narrower, the palatal foramina longer.

The *chrysopsis* group has a bicolour tail, and the pelage is long and full. The subsidiary enamel loops of the upper molars are well developed, but usually not continuous to outer edge of tooth.

The *levipes* group differs in having the pelage normal, as in *Reithrodontomys* s.s.

Subgenus Reithrodontomys

(with no subsidiary ridges normally in folds of upper molars)

The *rufescens* group contains forms distinguishable apparently by dark tawny coloration; sometimes vestigial, subsidiary ridges are said to occur in the molars.

The *fulvescens* group differ from *megalotis* group by longer tail, larger size, and usually the interpterygoid fossa is broader.

The *humulis* group is described as containing small forms with narrow skull and bicolour tail.

The *megalotis* group does not seem from Howell's revision to be clearly distinguishable from the *humulis* group, the species *montanus* being apparently intermediate; the members of the *humulis* group are, however, on average smaller than all other members of *Reithrodontomys* s.s.

These notes are collected from Howell's paper, for reference purposes; for a key to species and races this paper should be seen.

List of Named Forms

(Revised by Howell, North Amer. Fauna, No. 36, 1914.)

Subgenus *Reithrodontomys*, Giglioli

humulis Group

1. REITHRODONTOMYS HUMULIS HUMULIS, Audubon & Bachman

1841. Proc. Acad. Nat. Sci. Philadelphia, p. 97.
Charleston, Charleston County, S. Carolina.
Synonym: *dickinsoni*, Rhoads, 1895, Amer. Nat. XXIX, p. 590.
Willow Oak, Pasco County, Florida.

2. REITHRODONTOMYS HUMULIS IMPIGER, Bangs

1898. Proc. Biol. Soc. Washington, XII, p. 167.
White Sulphur Springs, Greenbrier County, W. Virginia.

3. REITHRODONTOMYS HUMULIS MERRIAMI, Allen

1895. Bull. Amer. Mus. Nat. Hist. VII, p. 119.
Austin Bayou, near Alvin, Brazoria County, Texas.

4. REITHRODONTOMYS ALBESCENS ALBESCENS, Cary

1903. Proc. Biol. Soc. Washington, XVI, p. 53.
18 miles north-west of Kennedy, Cherry County, Nebraska.

5. REITHRODONTOMYS ALBESCENS GRISEUS, Bailey

1905. North Amer. Fauna, no. 25, p. 106.
San Antonio, Bexar County, Texas.

megalotis Group

6. REITHRODONTOMYS MONTANUS, Baird

1855. Proc. Acad. Nat. Sci. Philadelphia, p. 335.
Probably near upper end of San Luis Valley, Saguache County, Colorado.

7. REITHRODONTOMYS MEGALOTIS MEGALOTIS, Baird

1857. Mamm. N. Amer. p. 451.
Between Janos, Chihuahua and San Luis Springs, Grant County, New Mexico.
Synonym: *megalotis deserti*, Allen, 1895, Bull. Amer. Mus. Nat. Hist. VII, p. 127. Oasis Valley, Nye County, Nevada.
megalotis sestinensis, Allen, 1903, Bull. Amer. Mus. Nat. Hist. XIX, p. 602. Rio Sestin, Durango, Mexico.

8. REITHRODONTOMYS MEGALOTIS AZTECUS, Allen

1893. Bull. Amer. Mus. Nat. Hist. V, p. 79.
La Plata, San Juan County, New Mexico.

9. REITHRODONTOMYS MEGALOTIS DYCHEI, Allen

1895. Bull. Amer. Mus. Nat. Hist. VII, p. 120.
Lawrence, Douglas County, Kansas.
Synonym: *dychei nebrascensis*, Allen, 1895, Bull. Amer. Mus. Nat. Hist. VII, p. 122. Kennedy, Nebraska.

10. REITHRODONTOMYS MEGALOTIS NIGRESCENS, Howell

1914. North Amer. Fauna, no. 36, p. 32.
Payette, Canyon County, Idaho.

11. REITHRODONTOMYS MEGALOTIS LONGICAUDUS, Baird

1857. Mamm. N. Amer. p. 451.
Petaluma, Sonoma County, California.
Synonym: *pallidus*, Rhoads, 1893, Amer. Nat. XXVII, p. 835.
klamathensis, Merriam, 1899, North Amer. Fauna, no. 16, p. 93.

12. REITHRODONTOMYS MEGALOTIS PENINSULAE, Elliot

1903. Field Columb. Mus. publ. 74, z.s. 3, p. 164.
San Quintin, Lower California.

13. REITHRODONTOMYS MEGALOTIS CINEREUS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 556.
Chalchicomula, Puebla, Mexico.

14. REITHRODONTOMYS MEGALOTIS ALTICOLA, Merriam

1901. Proc. Washington Acad. Sci. III, p. 556.
Cerro San Felipe, Oaxaca, Mexico.

15. REITHRODONTOMYS MEGALOTIS SATURATUS, Allen & Chapman

1897. Bull. Amer. Mus. Nat. Hist. IX, p. 201.
Las Vigas, Vera Cruz, Mexico.

16. REITHRODONTOMYS MEGALOTIS ARIZONENSIS, Allen

1895. Bull. Amer. Mus. Nat. Hist. VII, p. 134.
Chiricahua Mountains, Cochise County, Arizona.

17. REITHRODONTOMYS MEGALOTIS ZACATECAE, Merriam

1901. Proc. Washington Acad. Sci. III, p. 557.
Valparaiso Mountains, Zacatecas, Mexico.
Synonym: *megalotis obscurus*, Merriam, 1901, Proc. Washington Acad. Sci. III, p. 558. Chihuahua, Mexico.

18. REITHRODONTOMYS MEGALOTIS LIMICOLA, Bloeker

1932. Proc. Biol. Soc. Washington, XLV, p. 133.
Playa del Rey, Los Angeles County, California.

19. REITHRODONTOMYS MEGALOTIS CARYI, Howell
1935. Journ. Mamm. Baltimore, 16, p. 143.
Medano Ranch, 15 miles north-east of Mosca, Alamosa County, Colorado.

20. REITHRODONTOMYS AMOLES, Howell
1914. North Amer. Fauna, no. 36, p. 40.
Pina de Amoles, Queretaro, Mexico.

21. REITHRODONTOMYS CATALINAE, Elliot
1903. Field Columb. Mus. publ. 87, z.s. 3, p. 246.
Santa Catalina Island, Santa Barbara Islands, California.

22. REITHRODONTOMYS RAVIVENTRIS RAVIVENTRIS, Dixon
1908. Proc. Biol. Soc. Washington, XXI, p. 197.
Redwood City, San Mateo County, California.

23. REITHRODONTOMYS RAVIVENTRIS HALICOETES, Dixon
1909. Univ. Calif. Pub. Zool. V, p. 271.
3 miles south of Petaluma, Sonoma County, California.

fulvescens Group

24. REITHRODONTOMYS FULVESCENS FULVESCENS, Allen
1894. Bull. Amer. Mus. Nat. Hist. VI, p. 319.
Oposura, Sonoma, Mexico.

25. REITHRODONTOMYS FULVESCENS TENUIS, Allen
1899. Bull. Amer. Mus. Nat. Hist. XII, p. 15.
Rosario, Sinaloa, Mexico.
Synonym: *griseoflavus*, Merriam, 1901, Proc. Washington Acad. Sci. III, p. 553. Ameca, Jalisco.

26. REITHRODONTOMYS FULVESCENS INTERMEDIUS, Allen
1895. Bull. Amer. Mus. Nat. Hist. VII, p. 136.
Brownsville, Cameron County, Texas.
Synonym: *laceyi*, Allen, 1896, Bull. Amer. Mus. Nat. Hist. VIII, p. 235. Watson's Ranch, Bexar County, Texas.

27. REITHRODONTOMYS FULVESCENS AURANTIUS, Allen
1895. Bull. Amer. Mus. Nat. Hist. VII, p. 137.
Lafayette, Lafayette Parish, Louisiana.
Synonym: *chrysotis*, Elliot, 1899, Field Columb. Mus. publ. 37, z.s. 1, p. 281. Oklahoma.

28. REITHRODONTOMYS FULVESCENS DIFFICILIS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 556.
Orizaba, Vera Cruz, Mexico.
Synonym: (?) *sumichrasti*, Saussure, Rev. et. Mag. de Zool. 2, XIII, p. 3, 1861.

29. REITHRODONTOMYS FULVESCENS TOLTECUS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 555.
Tlalpam, Federal district, Mexico.
Synonym: *inexpectatus*, Elliot, 1903, Field. Columb. Mus. publ. 71, z.s. 3, p. 145. Michoacan, Mexico.

30. REITHRODONTOMYS FULVESCENS HELVOLUS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 554.
Oaxaca City, State of Oaxaca, Mexico.

31. REITHRODONTOMYS FULVESCENS CHIAPENSIS, Howell
1914. North Amer. Fauna, no. 36, p. 53.
Canjob, Chiapas, Mexico.

32. REITHRODONTOMYS FULVESCENS NELSONI, Howell
1914. North Amer. Fauna, no. 36, p. 53.
Colima, State of Colima, Mexico.

33. REITHRODONTOMYS FULVESCENS MUSTELINUS, Howell
1914. North Amer. Fauna, no. 36, p. 54.
Llano Grande, Oaxaca, Mexico.

34. REITHRODONTOMYS AMOENUS, Elliot
1905. Proc. Biol. Soc. Washington, XVIII, p. 234.
Reforma, Oaxaca, Mexico.

35. REITHRODONTOMYS OTUS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 555.
Foothill region of Sierra Nevada de Colima, Jalisco, Mexico.

rufescens Group

36. REITHRODONTOMYS RUFESCENS RUFESCENS, Allen & Chapman
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 199.
Jalapa, Vera Cruz, Mexico.

37. REITHRODONTOMYS RUFESCENS LUTEOLUS, Howell
1914. North Amer. Fauna, no. 36, p. 57.
Juquila, Oaxaca, Mexico.

38. REITHRODONTOMYS ALLENI, Howell
1914. North Amer. Fauna, no. 36, p. 59.
Mountains near Ozolotepec, Oaxaca, Mexico.

39. REITHRODONTOMYS COLIMAE COLIMAE, Merriam
1901. Proc. Washington Acad. Sci. III, p. 551.
Near timberline, Sierra Nevada de Colima, Jalisco, Mexico.

40. REITHRODONTOMYS COLIMAE NERTERUS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 551.
Foothill region of Sierra Nevada de Colima, Jalisco.

41. REITHRODONTOMYS DORSALIS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 557.
Calel, Guatemala.

42. REITHRODONTOMYS AUSTRALIS AUSTRALIS, Allen
1895. Bull. Amer. Mus. Nat. Hist. VII, p. 328.
Volcan de Irazu, Costa Rica.
Synonym: *australis vulcanius*, Bangs, 1902, Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 38. Volcan de Chiriqui, Panama.

43. REITHRODONTOMYS AUSTRALIS MODESTUS, Thomas
1907. Ann. Mag. Nat. Hist. 7, XX, p. 163.
Jinotega, Nicaragua.

Subgenus *Aporodon*, Howell

levipes Group

44. REITHRODONTOMYS LEVIPES, Merriam
1901. Proc. Washington Acad. Sci. III, p. 554.
San Sebastian, Jalisco, Mexico.

45. REITHRODONTOMYS HIRSUTUS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 553.
Ameca, Jalisco, Mexico.

chrysopsis Group

46. REITHRODONTOMYS CHRYSOPSIS CHRYSOPSIS, Merriam
1900. Proc. Biol. Soc. Washington, XIII, p. 152.
Mt. Popocatepetl, State of Mexico, Mexico.

47. REITHRODONTOMYS CHRYSOPSIS TOLUCAE, Merriam
1901. Proc. Washington Acad. Sci. III, p. 549.
North slope of Volcan Toluca, State of Mexico, Mexico.

48. REITHRODONTOMYS CHRYSOPSIS ORIZABAE, Merriam
1901. Proc. Washington Acad. Sci. III, p. 550.
Mt. Orizaba, Puebla, Mexico.

49. REITHRODONTOMYS PEROTENSIS, Merriam
1901. Proc. Washington Acad. Sci. III, p. 550.
Cofre de Perote, Vera Cruz, Mexico.

mexicanus Group

50. REITHRODONTOMYS PACIFICUS, Goodwin
1932. Amer. Mus. Nov. 560, p. 2.
Hacienda California, 6 miles from Ocos, Guatemala.

51. REITHRODONTOMYS MEXICANUS MEXICANUS, Saussure
1860. Rev. et. Mag. de Zool. ser. 2, XII, p. 109.
Mountains of Vera Cruz, Mexico.
Synonym: *costaricensis jalapae,* Merriam, 1901, Proc. Washington Acad. Sci. III, p. 552. Jalapa, Vera Cruz.

52. REITHRODONTOMYS MEXICANUS GOLDMANI, Merriam
1901. Proc. Washington Acad. Sci. III, p. 552.
Metlaltoyuca, Puebla, Mexico.

53. REITHRODONTOMYS MEXICANUS CHERRIEI, Allen
1891. Bull. Amer. Mus. Nat. Hist. III, p. 211.
San José, Costa Rica.
Synonym: *costaricensis*, Allen, 1895, Bull. Amer. Mus. Nat. Hist. VII, p. 139. La Carpintera, Costa Rica.

54. REITHRODONTOMYS MEXICANUS LUCIFRONS, Howell
1932. Proc. Biol. Soc. Washington, XLV, p. 125.
Cerro Cantoral, Honduras.

55. REITHRODONTOMYS MEXICANUS MINUSCULUS, Howell
1932. Proc. Biol. Soc. Washington, XLV, p. 125.
Comayabuela, just south of Teguicigalpa, Honduras.

56. REITHRODONTOMYS MEXICANUS HOWELLI, Goodwin

1932. Amer. Mus. Nov. no. 560, p. 1.
Chichicastenango (Santo Tomas) district of El Quiche, Guatemala.

57. REITHRODONTOMYS SÖDERSTRÖMI, Thomas

1898. Ann. Mag. Nat. Hist. 7, I, p. 451.
Quito, W. Ecuador.

58. REITHRODONTOMYS MILLERI, Allen

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 77.
Munchique, Cauca district, W. Colombia.

59. REITHRODONTOMYS GRACILIS GRACILIS, Allen & Chapman

1897. Bull. Amer. Mus. Nat. Hist. IX, p. 9.
Chichenitza, Yucatan, Mexico.

60. REITHRODONTOMYS GRACILIS ANTHONYI, Goodwin

1932. Amer. Mus. Nov. no. 560, p. 3.
Sacapulus, Central Guatemala.

tenuirostris Group

61. REITHRODONTOMYS TENUIROSTRIS TENUIROSTRIS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 547.
Todos Santos, Guatemala.

62. REITHRODONTOMYS TENUIROSTRIS AUREUS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 548.
Calel, Guatemala.

63. REITHRODONTOMYS CREPER, Bangs

1902. Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 39.
Volcan de Chiriqui, Chiriqui, Panama.

64. REITHRODONTOMYS MICRODON MICRODON, Merriam

1901. Proc. Washington Acad. Sci, III, p. 548.
Todos Santos, Guatemala.

65. REITHRODONTOMYS MICRODON ALBILABRIS, Merriam

1901. Proc. Washington Acad. Sci. III, p. 549.
Cerro San Felipe, Oaxaca, Mexico.

Genus 15. PEROMYSCUS, Gloger

1841. Peromyscus, Gloger, Hand. u. Hilfsbuch. d. Naturg. vol. 2, p. 95.

1867. Sitomys, Fitzinger, Sitz. Ber. K. Akad. Wiss. Wien. Math. Nat. Cl. LVI, p. 97. (*Cricetus myoides*, Gapper.)

1874. Vesperimus, Coues, Proc. Acad. Nat. Sci. Philadelphia, p. 178. (*Musculus leucopus*, Rafinesque.)

1894. Trinodontomys, Rhoads, Proc. Acad. Nat. Sci. Philadelphia, p. 257. (*Sitomys insolatus*, Rhoads = *Hesperomys sonoriensis*, Le Conte.)

1904. Haplomylomys, Osgood, Proc. Biol. Soc. Washington, XVII, p. 53. (*Hesperomys eremicus*, Baird.) Valid as a subgenus.

1898. Megadontomys, Merriam, Proc. Biol. Soc. Washington, XII, p. 115. (*Peromyscus thomasi*, Merriam.) Valid as a subgenus.

1909. Ochrotomys, Osgood, North Amer. Fauna, no. 28, p. 222. (*Arvicola nuttalli*, Harlan.) Valid as a subgenus.

1909. Podomys, Osgood, North Amer. Fauna, no. 28, p. 226. (*Hesperomys floridanus*, Chapman.) Valid as a subgenus.

TYPE SPECIES.—*Peromyscus arboreus*, Gloger = *Mus sylvaticus novaeboracensis*, Fischer.

RANGE.—Entire North American Continent, from Panama northwards to Alaska and Labrador.

NUMBER OF FORMS.—About a hundred and seventy-eight.

CHARACTERS.—Skull with interorbital constriction always apparent; not developing strong supraorbital ridges, which are totally absent as a general rule. Rostrum pointed and relatively long. Nasals usually projecting forwards over incisors; sometimes tending to become broad anteriorly, as in *zarhynchus*, and other larger tropical forms. Interparietal well developed. Zygoma slender. Zygomatic plate narrow, nearly straight anteriorly. Palate extending about to middle part of M.3. Palatal foramina broad, well open, usually or often reaching M.1. Mandible with coronoid process normally strongly reduced. M.1 with five cusps, the cusps alternating, the pits separating them not tending to become isolated; between the main cusps are re-entrant folds, four (two each side) in M.1, three (two outer, one inner) in M.2. The main folds have in typical forms well-developed subsidiary ridges. M.3 is strongly reduced. Upper cheekteeth three-rooted, lower series two-rooted (Osgood). M.1 lower with anterior cusps usually fused, and four cusps behind these. M.2 like M.1, but without anterior cusp; M.3 reduced, often more or less S-shaped. The cusps alternating, the folds deep. The bullae as a rule are not large.

Cheekpouches "more or less developed" (Osgood). Mammae 6, or in subgenus *Haplomylomys*, 4. Ear relatively large. Tail usually relatively well haired, sometimes in northern forms completely haired, and tufted. Fur usually soft. Plantar pads 6 (reduced to 5 in subgenus *Podomys*). Tail not reduced in length. Hindfoot slender, the digits normal; sole sometimes hairy. Form Rat or Mouselike; the subgenus *Megadontomys* contains the largest species of the genus (up to 150 head and body length in B.M. material).

MEGADONTOMYS, from Mexico and Panama, is regarded as a subgenus by Osgood; the cheekteeth are more complex than in *Peromyscus*, the subsidiary ridges of the lower molars more strongly developed; the anterior cusp of first upper molar may be partly divided. Size largest of genus.

OCHROTOMYS, Eastern United States, is proposed as a subgenus for *P. nuttalli*; resembling *Peromyscus*, but posterior palatal foramina placed further backwards; a rudimentary seventh plantar pad present; "molariform teeth relatively wide, the enamel folds much compressed, enamel relatively thicker than in *Peromyscus*, the pattern as seen in partly worn teeth being much compressed laterally and longtitudinally, so that the folds of the two sides touch in almost all stages of wear, leaving five subtriangular islands of dentine in M.1 and four in M.2. Lower molars similarly peculiar" (Osgood). Subsidiary ridges in the main folds present.

PODOMYS is proposed as a subgenus for *P. floridanus*, from Florida. The plantar pads are reduced to 5. The subsidiary ridges in the upper molars are very small, not extending to outer edge of toothrow.

HAPLOMYLOMYS is proposed as a subgenus for a few species from the Western United States, in which the upper cheekteeth have the subsidiary ridges in the main folds vestigial (*P. crinitus*), or altogether suppressed. Mammae reduced to 4. Tail longer than head and body.

There seems to be a tendency, so far as seen, for the tropical Central American species to be much larger in general appearance than the Canadian and United States forms.

Osgood divides *Peromyscus* s.s. into eight specific groups. Unfortunately from his revision, and keys, the characters of these groups are not clear at all.

Of the four groups which occur north of Mexico, the *truei* group is apparently distinguishable clearly from the others on account of enlarged ears. The four groups which are confined to Mexico average larger than the northern forms; the *melanophrys* group appears to be characterized by very long tail; the *mexicanus* group are said to have the tail poorly haired, the scaly annulations scarcely concealed. The *megalops* group contains the largest forms of the subgenus.

Forms seen: *arcticus*, *austerus*, *auritus*, *aureolus*, *auripectus*, *beatae*, *boylii*, *cacabatus*, *californicus*, *canadensis*, *cecilii*, *coolidgei*, *comptus*, *cristobalensis*, *difficilis*, *eremicus*, *eva*, *felipensis*, *fraterculus*, *flavidus*, *floridanus*, *furvus*, *gadovii*, *gambelii*, *gilberti*, *guatemalensis*, *gossypinus*, *gratus*, *gymnotis*, *insignis*, *leucopus*, *leucurus*, *madrensis*, *major*, *maniculatus*, *martirensis*, *mearnsi*, *medius*, *megalops*, *melanotis*, *mexicanus*, *michiganensis*, "*musculoides*," *nebrascensis*, *niveiventris*, *nudipes*, *orizabae*, *palmarius*, *phasma*, *pinalis*, *rufinus*, *saturatus*, *sonoriensis*, *spicilegus*, *saxatilis*, *stephensi*, *tehuantepecus*, *thomasi*, *totontepecus*, *truei*, *umbrinus*, *zarhynchus*.

List of Named Forms

(Genus revised by Osgood, North Amer. Fauna, No. 28, 1909. For range maps see Osgood and Anthony, Field Book North American Mammals, 1928.)

Subgenus *Haplomylomys*, Osgood

1. PEROMYSCUS CRINITUS CRINITUS, Merriam

1891. North Amer. Fauna, no. 5, p. 53.
Shoshone Falls, Snake River, Lincoln County, Idaho.
Synonym: *crinitus scitulus*, Bangs, 1899, Proc. New Engl. Club. 1, p. 67. Gardnerville, Nevada.

2. PEROMYSCUS CRINITUS AURIPECTUS, Allen

1893. Bull. Amer. Mus. Nat. Hist. V, p. 75.
Bluff City, San Juan County, Utah.

3. PEROMYSCUS CRINITUS STEPHENSI, Mearns

1897. Proc. U.S. Nat. Mus. XIX, p. 721.
3 miles east of Mountain Spring, Imperial County, Idaho.
Synonym: *petraius*, Elliot, 1903, Field Columb. Mus. publ. z.s. 2, p. 244. California.

4. PEROMYSCUS CRINITUS PALLIDISSIMUS, Huey

1931. Trans. S. Diego Nat. Hist. Soc. VI, p. 389.
Small Island in Gonzana Bay, Lower California.

5. PEROMYSCUS CRINITUS DISPARILIS, Goldman

1932. Proc. Biol. Soc. Washington, XLV, p. 90.
Tinajas Atlas, Gila Mountains, Yuma County, Arizona.

6. PEROMYSCUS CALIFORNICUS CALIFORNICUS, Gambel

1848. Proc. Acad. Nat. Sci. Philadelphia, IV, p. 78.
Monterey, Monterey County, California.

7. PEROMYSCUS CALIFORNICUS INSIGNIS, Rhoads

1895. Proc. Acad. Nat. Sci. Philadelphia, p. 33.
Dulzura, San Diego County, California.

8. PEROMYSCUS CALIFORNICUS BENITOENSIS, Grinnell & Orr

1934. Journ. Mamm. Baltimore, 15, p. 216.
Near Cook P.O., Bear Valley, San Benito County, California.

9. PEROMYSCUS CALIFORNICUS MARIPOSAE, Grinnell & Orr

1934. Journ. Mamm. Baltimore, 15, p. 217.
El Portal, Mariposa County, California.

10. PEROMYSCUS EREMICUS EREMICUS, Baird

1857. Mamm. North Amer. p. 479.
Old Fort Yuma, Imperial County, California, on Colorado River, opposite Yuma, Arizona.
Synonym: *merriami*, Mearns, 1896, Proc. U.S. Nat. Mus. XIX, p. 138. Sonoyta, Sonora, Mexico.
arenarius, Mearns, 1896, same reference. Near El Paso, El Paso, Texas.

11. PEROMYSCUS EREMICUS FRATERCULUS, Merriam

1892. Amer. Nat. XXVI, p. 261.
Dulzura, San Diego County, California.
Synonym: *homochroia*, Elliot, 1903, Field Columb. Mus. publ. z.s. 74, 3, p. 158. San Quintin, Lower California.
herronii, Rhoads, 1893, Amer. Nat. XXVII, p. 832. Reche Canyon, California.
herronii nigellus, Rhoads, 1894, Proc. Acad. Nat. Sci. Philadelphia, p. 257. West Cajon Pass, San Bernardino County, California.

12. PEROMYSCUS EREMICUS CEDROSENSIS, Allen

1898. Bull. Amer. Mus. Nat. Hist. X, p. 154.
Cerros Island, Lower California.

13. PEROMYSCUS EREMICUS EVA, Thomas

1898. Ann. Mag. Nat. Hist. 7, I, p. 44.
San José del Cabo, Lower California.
Synonym: *propinquus*, Allen, 1898, Bull. Amer. Mus. Nat. Hist. X, p. 154.

14. PEROMYSCUS EREMICUS INSULICOLA, Osgood

1909. North Amer. Fauna, no. 28, p. 246.
Espiritu Santo Island, Gulf of California, Lower California.

15. PEROMYSCUS EREMICUS AVIUS, Osgood

1909. North Amer. Fauna, no. 28, p. 247.
Ceralbo Island, Lower California.

16. PEROMYSCUS EREMICUS POLYPOLIUS, Osgood

1909. North Amer. Fauna, no. 28, p. 248.
Margarita Island, off west coast southern Lower California.

17. PEROMYSCUS EREMICUS ANTHONYI, Merriam

1887. Proc. Biol. Soc. Washington, IV, p. 2.
Camp Apache, Big Hachita Mountains, Grant County, New Mexico.

18. PEROMYSCUS EREMICUS PAPAGENSIS, Goldman

1917. Proc. Biol. Soc. Washington, XXX, p. 110.
Pinacate Mountains, Sonora, Mexico.

19. PEROMYSCUS EREMICUS TIBURONENSIS, Mearns

1897. Proc. U.S. Nat. Mus. XIX, p. 720.
Tiburon Island, Sonora, Mexico.

20. PEROMYSCUS EREMICUS PHAEURUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 75.
Hacienda la Parana, San Luis Potosi, Mexico.

21. PEROMYSCUS EREMICUS CARMENI, Townsend

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 126.
Carmen Island, Lower California.

22. PEROMYSCUS EREMICUS CINEREUS, Hall

1931. Proc. Biol. Soc. Washington, XLIV, p. 87.
South-west end of San José Island, Lower California.

23. PEROMYSCUS EREMICUS PULLUS, Blossom

1933. Occ. Pap. Mus. Zool. Univ. Mich. no. 265, p. 3.
Black Mountains, 10 miles south of Tucson, Pima County, Arizona.

24. PEROMYSCUS GUARDIA GUARDIA, Townsend

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 126.
Angel de la Guardia Island, Lower California.

25. PEROMYSCUS GUARDIA MEJIAE, Burt

1932. Trans. S. Diego Nat. Hist. Soc. VII, p. 174.
Mejia Island, Gulf of California.

26. PEROMYSCUS STEPHANI, Townsend

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 126.
San Esteban Island, Gulf of California, Lower California.

27. PEROMYSCUS GOLDMANI, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 75.
Alamos, Sonora, Mexico.

28. PEROMYSCUS SLEVINI, Maillard

1924. Proc. Cal. Acad. Sci. XII, p. 1221.
Santa Catalina Island, 17 miles north-east of Punta San Marcial, Lower California.

29. PEROMYSCUS COLLATUS, Burt

1932. Trans. S. Diego Nat. Hist. Soc. VII, p. 172.
Turner's Island, Gulf of Carpentaria, Sonora, Mexico.

30. PEROMYSCUS PSEUDOCRINITUS, Burt

1932. Trans. S. Diego Nat. Hist. Soc. VII, p. 173.
Coronados Island, Gulf of California, Lower California.

31. PEROMYSCUS CANICEPS, Burt

1932. Trans. S. Diego Nat. Hist. Soc. VII, p. 174.
Montserrate Island, Gulf of California, Lower California.

32. PEROMYSCUS INTERPARIETALIS, Burt

1932. Trans. S. Diego Nat. Hist. Soc. VII, p. 175.
South San Lorrenzo Island, Lower California.

33. PEROMYSCUS DICKEYI, Burt

1932. Trans. S. Diego Nat. Hist. Soc. VII, p. 176.
Tortuga Island, Lower California.

34. PEROMYSCUS PEMBERTONI, Burt

1932. Trans. S. Diego Nat. Hist. Soc. VII, p. 176.
San Pedro Nolasco Island, Sonora, Mexico.

Subgenus *Peromyscus*, Gloger

maniculatus Group

35. PEROMYSCUS MANICULATUS MANICULATUS, Wagner

1845. Wiegmann's Arch. für Naturg. XI (1), p. 148.
The Moravian Settlements in Labrador, Canada.
Synonym: *arcticus*, Coues, 1877, Monogr. North Amer. Rodentia, p. 61.
bairdii, Coues, same reference, p. 61.
canadensis umbrinus, Miller, 1897, Proc. Boston Soc. Nat. Hist. XXVIII, p. 23. Peninsula Harbour, north shore Lake Superior, Ontario.

36. PEROMYSCUS MANICULATUS GRACILIS, Le Conte

1855. Proc. Acad. Nat. Sci. Philadelphia, VII, p. 442.
Michigan.
Synonym: *canadensis*, Miller, 1893, Proc. Biol. Soc. Washington, VIII, p. 55. Peterboro, New York.
myoides, Gapper, 1830, Zool. Journ. V, p. 204. Canada.

37. PEROMYSCUS MANICULATUS ABIETORUM, Bangs

1896. Proc. Biol. Soc. Washington, X, p. 49.
James River, Nova Scotia, Canada.

38. PEROMYSCUS MANICULATUS ARGENTATUS, Copeland & Church

1906. Proc. Biol. Soc. Washington, XIX, p. 122.
Grand Harbour, Island of Grand Manan, New Brunswick, Canada.

39. PEROMYSCUS MANICULATUS EREMUS, Osgood

1909. North Amer. Fauna, no. 28, p. 47.
Pleasant Bay, Grindstone Island, Magdalen Islands, Quebec, Canada.

40. PEROMYSCUS MANICULATUS NUBITERRAE, Rhoads

1896. Proc. Acad. Nat. Sci. Philadelphia, p. 187.
Summit of Roan Mountain, Mitchell County, N. Carolina.

41. PEROMYSCUS MANICULATUS BOREALIS, Mearns

1911. Proc. Biol. Soc. Washington, XXIV, p. 102.
Fort Simpson, Mackenzie, Canada.
Synonym: *arcticus*, Mearns, 1890, Bull. Amer. Mus. Nat. Hist. II, p. 285.

42. PEROMYSCUS MANICULATUS OREAS, Bangs

1898. Proc. Biol. Soc. Washington, XII, p. 84.
Mt. Baker Range, British Columbia, Canada, near boundary of Whatcom County, Washington.

43. PEROMYSCUS MANICULATUS HYLAEUS, Osgood

1908. Proc. Biol. Soc. Washington, XXI, p. 141.
Hollis, Kasaan Bay, Prince of Wales Island, Alaska.

44. PEROMYSCUS MANICULATUS KEENI, Rhoads

1894. Proc. Acad. Nat. Sci. Philadelphia, p. 258.
Masset, Graham Island, Queen Charlotte Islands, British Columbia.

45. PEROMYSCUS MANICULATUS ALGIDUS, Osgood

1909. North Amer. Fauna, no. 28, p. 56.
Head of Lake Bennett, site of Old Bennett City, British Columbia, Canada.

46. PEROMYSCUS MANICULATUS MACRORHINUS, Rhoads

1894. Proc. Acad. Nat. Sci. Philadelphia, p. 259.
Mouth of Skeena River, British Columbia, Canada.

47. PEROMYSCUS MANICULATUS ARTEMISIAE, Rhoads

1894. Proc. Acad. Nat. Sci. Philadelphia, p. 260.
Ashcroft, British Columbia, Canada.
Synonym: *subarcticus*, Allen, 1899, Bull. Amer. Mus. Nat. Hist. XII, p. 15. Montana.

48. PEROMYSCUS MANICULATUS SATURATUS, Bangs

1897. Amer. Nat. XXXI, p. 75.
Saturna Island, in Gulf of Georgia, halfway between Victoria and Vancouver City, British Columbia.

49. PEROMYSCUS MANICULATUS HOLLISTERI, Osgood

1909. North Amer. Fauna, no. 28, p. 62.
Friday Harbour, San Juan Island, San Juan County, Washington.

50. PEROMYSCUS MANICULATUS AUSTERUS, Baird

1855. Proc. Acad. Nat. Sci. Philadelphia, VII, p. 336.
Old Fort Steilacoom, Pierce County, Washington.
Synonym: *akeleyi*, Elliot, 1899, Field Columb. Mus. publ. 30, z.s. 1, p. 226. Johnson's Ranch, Elwah River, Clallam County, Washington.

51. PEROMYSCUS MANICULATUS RUBIDUS, Osgood

1901. Proc. Biol. Soc. Washington, XIV, p. 193.
Mendocino City, Mendocino County, California.
Synonym: *perimekurus*, Elliot, 1903, Field Columb. Mus. publ. 74, z.s. 3, p. 156. Goldbeach, Curry County, Oregon.

52. PEROMYSCUS MANICULATUS GAMBELII, Baird

1857. Mamm. North Amer. p. 464.
Monterey, Monterey County, California.
Synonym: *texanus medius*, Mearns, 1896, Proc. U.S. Nat. Mus. XVIII, p. 446. Lower California.
americanus thurberi, Allen, 1893, Bull. Amer. Mus. Nat. Hist. V, p. 185. Lower California.

53. PEROMYSCUS MANICULATUS RUFINUS, Merriam

1890. North Amer. Fauna, no. 3, p. 65.
San Francisco Mountain, Coconino County, Arizona.

54. PEROMYSCUS MANICULATUS OSGOODI, Mearns

1911. Proc. Biol. Soc. Washington, XXIV, p. 102.
Calf Creek, Custer County, Montana.

55. PEROMYSCUS MANICULATUS NEBRASCENSIS, Coues

1877. Monogr. North Amer. Rodentia, p. 79.
Deer Creek, W. Nebraska.
Synonym: *luteus*, Osgood, 1905, Proc. Biol. Soc. Washington, XVIII, p. 77.

56. PEROMYSCUS MANICULATUS BAIRDII, Hoy & Kennicott

1857. Agricultural Report, U.S. Patent Office, 1856, p. 92.
Bloomington, McLean County, Illinois.
Synonym: *michiganensis*, True, Proc. U.S. Nat. Mus. VII, 1884, p. 597.

57. PEROMYSCUS MANICULATUS PALLESCENS, Allen

1896. Bull. Amer. Mus. Nat. Hist. VIII, p. 238.
San Antonio, Bexar County, Texas.

58. PEROMYSCUS MANICULATUS BLANDUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 56.
Escalon, Chihuahua, Mexico.

59. PEROMYSCUS MANICULATUS FULVUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 57.
Oaxaca, State of Oaxaca, Mexico.

60. PEROMYSCUS MANICULATUS LABECULA, Elliot

1903. Field Columb. Mus. publ. 71, z.s. vol. 3, p. 143.
Ocotlan, Jalisco, Mexico.

61. PEROMYSCUS MANICULATUS SONORIENSIS, Le Conte

1853. Proc. Acad. Nat. Sci. Philadelphia, p. 413.
Santa Cruz, Sonora, Mexico.
Synonym: *oresterus*, Elliot, 1903, Field Columb. Mus. publ. 74, z.s. 3, p. 159. Lower California.
insolatus, Rhoads, 1894, Proc. Acad. Nat. Sci. Philadelphia, p. 256. California.
deserticola, Mearns, 1890, Bull. Amer. Mus. Nat. Hist. II, p. 285. California.

62. PEROMYSCUS MANICULATUS COOLIDGEI, Thomas

1898. Ann. Mag. Nat. Hist. 7, I, p. 45.
Santa Anita, Cape region of Lower California.

63. PEROMYSCUS MANICULATUS MARGARITAE, Osgood

1909. North Amer. Fauna, no. 28, p. 95.
Margarita Island, off west coast southern Lower California.

64. PEROMYSCUS MANICULATUS CLEMENTIS, Mearns

1896. Proc. U.S. Nat. Mus. XVIII, p. 446.
San Clemente Island, Santa Barbara Islands, California.

65. PEROMYSCUS MANICULATUS CATALINAE, Elliot

1903. Field Columb. Mus. publ. 74, z.s. 3, p. 160.
Santa Catalina Island, Santa Barbara Islands, California.

66. PEROMYSCUS MANICULATUS DUBIUS, Allen

1898. Bull. Amer. Mus. Nat. Hist. X, p. 157.
Todos Santos Island, Lower California.

67. PEROMYSCUS MANICULATUS GERONIMENSIS, Allen

1898. Bull. Amer. Mus. Nat. Hist. X, p. 156.
San Geronimo Island, Lower California.
Synonym: *exiguus*, Allen, 1898, Bull. Amer. Mus. Nat. Hist. X, p. 157.
San Martin Island, Lower California.
martinensis, Nelson & Goldman, 1931, Journ. Washington Acad. Sci. XXI, p. 534.

68. PEROMYSCUS MANICULATUS CINERITIUS, Allen

1898. Bull. Amer. Mus. Nat. Hist. X, p. 155.
San Roque Island, Lower California.

69. PEROMYSCUS MANICULATUS MAGDALENAE, Osgood

1909. North Amer. Fauna, no. 28, p. 101.
Magdalena Island, Lower California.

70. PEROMYSCUS MANICULATUS ASSIMILIS, Nelson & Goldman

1931. Journ. Mamm. Baltimore, 12, p. 305.
Coronados Island, north-west coast Lower California.

71. PEROMYSCUS MANICULATUS STREATORI, Nelson & Goldman

1931. Journ. Washington Acad. Sci. XXI, p. 531.
San Miguel Island, off coast of S. California.

72. PEROMYSCUS MANICULATUS SANTACRUZAE, Nelson & Goldman

1931. Journ. Washington Acad. Sci. XXI, p. 532.
Santa Cruz Island, off coast of S. California.

73. PEROMYSCUS MANICULATUS EXTERUS, Nelson & Goldman

1931. Journ. Washington Acad. Sci. XXI, p. 532.
San Nicolas Island, coast of S. California.

74. PEROMYSCUS MANICULATUS ELUSUS, Nelson & Goldman

1931. Journ. Washington Acad. Sci. XXI, p. 533.
Santa Barbara Island, off S. California.

75. PEROMYSCUS MANICULATUS DORSALIS, Nelson & Goldman

1931. Journ. Washington Acad. Sci. XXI, p. 535.
Natividad Island, off west coast Lower California.

76. PEROMYSCUS MANICULATUS HUEYI, Nelson & Goldman

1931. Trans. S. Diego Nat. Hist. Soc. VII, p. 51.
A small unnamed island in Gonzaga Bay, east coast Lower California.

77. PEROMYSCUS MANICULATUS INTERDICTUS, Anderson

1932. Bull. Nat. Mus. Canada, no. 70, p. 110.
Forbidden Plateau, near eastern edge of Strathcona Park, north of Mt. Albert Edward, about 17 miles west of Comox, Vancouver Island, British Columbia.

78. PEROMYSCUS MANICULATUS ANGUSTUS, Hall

1932. Univ. Calif. Pub. Zool. 38, p. 423.
Beaver Creek, 15 miles north-west of Alberni, Vancouver Island, British Columbia.

79. PEROMYSCUS MANICULATUS OZARKIARUM, Black

1935. Journ. Mamm. Baltimore, 16, p. 144.
3 miles south of Winslow, Washington County, Arkansas.

80. PEROMYSCUS SITKENSIS SITKENSIS, Merriam

1897. Proc. Biol. Soc. Washington, XI, p. 223.
Sitka, Alaska.

81. PEROMYSCUS SITKENSIS PREVOSTENSIS, Osgood

1901. North Amer. Fauna, no. 21, p. 29.
Prevost Island, Queen Charlotte Group, British Columbia.

82. PEROMYSCUS SITKENSIS ISOLATUS, Cowan

1935. Univ. Calif. Pub. Zool. 40, p. 434.
Pine Island, Queen Charlotte Sound, north end of Vancouver Island, British Columbia.

83. PEROMYSCUS SITKENSIS OCEANICUS, Cowan

1935. Univ. Calif. Pub. Zool. 40, p. 432.
Forrester Island, Alaska.

84. PEROMYSCUS POLIONOTUS POLIONOTUS, Wagner

1843. Wiegmann's Arch. für Naturg. IX (2), p. 52.
Georgia.
Synonym: *baliolus*, Bangs, 1898, Science, n.s. VIII, p. 215. Georgia.
arenarius, Bangs, Proc. Boston Soc. Nat. Hist. XXVIII, p. 202, 1898. Georgia.
subgriseus, Chapman, 1893, Bull. Amer. Mus. Nat. Hist. V, p. 340. Gainesville, Alachua County, Florida.

85. PEROMYSCUS POLIONOTUS NIVEIVENTRIS, Chapman

1889. Bull. Amer. Mus. Nat. Hist. II, p. 117.
On east peninsula, opposite Micco, Brevard County, Florida.

86. PEROMYSCUS POLIONOTUS PHASMA, Bangs

1898. Proc. Boston Soc. Nat. Hist. XXVIII, p. 199.
Point Romo, Anastasia Island, St. John County, Florida.

87. PEROMYSCUS POLIONOTUS RHOADSI, Bangs

1898. Proc. Boston Soc. Nat. Hist. XXVIII, p. 201.
Anclote River, Hillsboro County, Florida.

88. PEROMYSCUS POLIONOTUS ALBIFRONS, Osgood

1909. North Amer. Fauna, no. 28, p. 108.
Whitfield, Walton County, Florida.

89. PEROMYSCUS LEUCOCEPHALUS, Howell

1920. Journ. Mamm. Baltimore, 1, p. 239.
Santa Rosa Island, opposite Camp Walton, Santa Rosa County, Florida.

90. PEROMYSCUS MELANOTIS, Allen & Chapman

1897. Bull. Amer. Mus. Nat. Hist. IX, p. 203.
Las Vigas, Vera Cruz, Mexico.
Synonym: *cecilii*, Thomas, 1903, Ann. Mag. Nat. Hist. 7, XI, p. 486. South slope Mt. Orizaba, Puebla, Mexico.
melanotis zamelas, Osgood, 1904, Proc. Biol. Soc. Washington, XVII, p. 59. Colonia Garcia, Chihuahua, Mexico.

91. PEROMYSCUS SEJUGIS, Burt

1932. Trans. S. Diego Nat. Hist. Soc. VII, p. 171.
Santa Cruz Island, Lower California.

leucopus Group

92. PEROMYSCUS LEUCOPUS LEUCOPUS, Rafinesque

1818. Amer. Monthly Mag. 3, p. 446.
Pine barrens of Kentucky.

93. PEROMYSCUS LEUCOPUS NOVAEBORACENSIS, Fischer

1829. Synopsis Mamm. p. 318.
New York.
Synonym: *minnesotae*, Mearns, 1901, Proc. Biol. Soc. Washington, XIV, p. 154. Minnesota.
emmonsi, Dekay, 1840, in Emmons, Rept. Quad. Mass. 61.
campestris, Le Conte, 1853, Proc. Acad. Nat. Sci. Philadelphia, VI, p. 413.

94. PEROMYSCUS LEUCOPUS AMMODYTES, Bangs

1905. Proc. New Engl. Zool. Club, IV, p. 14.
Monomoy Island, Barnstaple County, Massachusetts.

95. PEROMYSCUS LEUCOPUS FUSUS, Bangs

1905. Proc. New Engl. Zool. Club, IV, p. 13.
West Tisbury, Island of Martha's Vineyard, Dukes County, Massachusetts.

96. PEROMYSCUS LEUCOPUS ARIDULUS, Osgood

1909. North Amer. Fauna, no. 28, p. 122.
Fort Custer, Yellowstone County, Montana.

97. PEROMYSCUS LEUCOPUS OCHRACEUS, Osgood

1909. North Amer. Fanua, no. 28, p. 124.
Winslow, Navajo County, Arizona.

98. PEROMYSCUS LEUCOPUS TORNILLO, Mearns

1896. Proc. U.S. Nat. Mus. XVIII, p. 445.
Rio Grande, about 6 miles above El Paso, Texas.
Synonym: *flaccidus*, Allen, 1903, Bull. Amer. Mus. Nat. Hist. XIX, p. 599. Durango, Mexico.

99. PEROMYSCUS LEUCOPUS ARIZONAE, Allen

1894. Bull. Amer. Mus. Nat. Hist. VI, p. 321.
Fairbank, Cochisa County, Arizona.

100. PEROMYSCUS LEUCOPUS TEXANUS, Woodhouse

1853. Proc. Acad. Nat. Sci. Philadelphia, VI, p. 242.
Probably vicinity of Mason, Mason County, Texas.
Synonym: *mearnsi*, Allen, 1891, Bull. Amer. Mus. Nat. Hist. III, p. 300. Brownsville, Cameron County, Texas.
canus, Mearns, 1896, Proc. U.S. Nat. Mus. XVIII, p. 445. Fort Clark, Kinney County, Texas.

101. PEROMYSCUS LEUCOPUS MESOMELAS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 57.
Orizaba, Vera Cruz, Mexico.

102. PEROMYSCUS LEUCOPUS CASTANEUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 58.
Yohaltun, Campeche, Mexico.

103. PEROMYSCUS LEUCOPUS AFFINIS, Allen

1892. Proc. U.S. Nat. Mus. (1891), XIV, p. 195.
Barrio, Oaxaca, Mexico.
Synonym: *musculoides*, Merriam, 1898, Proc. Biol. Soc. Washington, XII, p. 124.

104. PEROMYSCUS LEUCOPUS COZUMELAE, Merriam

1901. Proc. Biol. Soc. Washington, XIV, p. 103.
Cozumel Island, off coast of Yucatan, Mexico.

105. PEROMYSCUS GOSSYPINUS GOSSYPINUS, Le Conte

1853. Proc. Acad. Nat. Sci. Philadelphia, VI, p. 411.
Georgia, probably the Le Conte Plantation, near Riceboro, Liberty County.
Synonym: *nigriculus*, Bangs, 1896, Proc. Biol. Soc. Washington, X, p. 124. Burbridge, Plaquemines Parish, Louisiana.
cognatus, Le Conte, 1855, Proc. Acad. Nat. Sci. Philadelphia, VII, p. 442. Georgia and S. Carolina.

106. PEROMYSCUS GOSSYPINUS MEGACEPHALUS, Rhoads

1894. Proc. Acad. Nat. Sci. Philadelphia, p. 254.
Woodville, Jackson County, Alabama.
Synonym: *mississippiensis*, Rhoads, 1896, Proc. Acad. Nat. Sci. Philadelphia, p. 189. Samburg, Reelfoot Lake, Obion County, Tennessee.

107. PEROMYSCUS GOSSYPINUS PALMARIUS, Bangs

1896. Proc. Biol. Soc. Washington, X, p. 124.
Oak Lodge, on east peninsula opposite Micco, Brevard County, Florida.

108. PEROMYSCUS GOSSYPINUS ANASTASAE, Bangs

1898. Proc. Boston Soc. Nat. Hist. XXVIII, p. 195.
Point Romo, Anastasia Island, St. John County, Florida.
Synonym: *insulanus*, Bangs, 1898, Proc. Boston Soc. Nat. Hist. XXVIII, p. 196. Cumberland Island, Georgia.

boylii Group

109. PEROMYSCUS BOYLII BOYLII, Baird

1855. Proc. Acad. Nat. Sci. Philadelphia, VII, p. 335.
Middle fork of American River, Eldorado County, California.
Synonym: *robustus*, Allen, 1893, Bull. Amer. Mus. Nat. Hist. V, p. 335. Lakeport, Lake County, California.

110. PEROMYSCUS BOYLII ROWLEYI, Allen

1893. Bull. Amer. Mus. Nat. Hist. V, p. 76.
Noland Ranch, San Juan River, San Juan County, Utah.
Synonym: *gaurus*, Elliot, 1903, Field Columb. Mus. pub. 74, z.s. 3, p. 157. San Antonio, San Pedro Martir Mountains, Lower California.
parasiticus, Elliot, 1903, Field Columb. Mus. pub. 87, z.s. 3, p. 244. Lone Pine, Inyo County, California.
metallicola, Elliot, 1903, Field Columb. Mus. pub. 87, z.s. 3, p. 245. Providencia Mines, Chihuahua, Mexico.
penicillatus, Mearns, 1896, Advance Sheet Proc. U.S. Nat. Mus. XVIII, p. 2. Franklin Mountains, near El Paso, Texas.

(*Peromyscus boylii rowleyi*) *pinalis*, Miller, 1893, Bull. Amer. Mus. Nat. Hist. V, p. 331. Granite Gap, Grant County, New Mexico.
major, Rhoads, 1893, Amer. Nat. XXVII, p. 831. Squirrel Inn, San Bernardino County, California.

111. PEROMYSCUS BOYLII ATTWATERI, Allen

1895. Bull. Amer. Mus. Nat. Hist. VII, p. 330.
Turtle Creek, Kerr County, Texas.
Synonym: *bellus*, Bangs, 1896, Proc. Biol. Soc. Washington, X, p. 137. Stilwell, Adair County, Oklahoma.
laceyi, Bailey, 1905, North Amer. Fauna, no. 25, p. 99. Turtle Creek, Kerr County, Texas.

112. PEROMYSCUS BOYLII SPICILEGUS, Allen

1897. Bull. Amer. Mus. Nat. Hist. IX, p. 50.
Mineral San Sebastian, Mascota, Jalisco, Mexico.

113. PEROMYSCUS BOYLII SIMULUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 64.
San Blas, Nayarit, Mexico.

114. PEROMYSCUS BOYLII MADRENSIS, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 16.
Maria Madre Island, Tres Marias Islands, Jalisco, Mexico.

115. PEROMYSCUS BOYLII EVIDES, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 64.
Juquila, Oaxaca, Mexico.

116. PEROMYSCUS BOYLII LEVIPES, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 123.
Mt. Malinche, Tlaxcala, Mexico.
Synonym: *beatae*, Thomas, 1903, Ann. Mag. Nat. Hist. 7, XI, p. 485. Mt. Orizaba, Mexico.

117. PEROMYSCUS BOYLII AZTECUS, Saussure

1860. Rev. et Mag. de Zool. 2, XII, p. 105.
S. Mexico.

118. PEROMYSCUS BOYLII CORDILLERAE, Dickey

1928. Proc. Biol. Soc. Washington, XLI, p. 2.
Mt. Cacaguatique, Dept. San Miguel, El Salvador.

119. PEROMYSCUS BOYLII SACARENSIS, Dickey

1928. Proc. Biol. Soc. Washington, XLI, p. 3.
San José del Sacare, Dept. Chalatenango, El Salvador.

120. PEROMYSCUS BOYLII GLASSELLI, Burt

1932. Trans. S. Diego Nat. Hist. Soc. VII, p. 171.
San Pedro Nolasco Island, Gulf of California, Sonora, Mexico.

121. PEROMYSCUS OAXACENSIS, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 122.
Cerro San Felipe, Oaxaca, Mexico.

122. PEROMYSCUS HYLOCETES, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 124.
Patzcuaro, Michoacan, Mexico.

123. PEROMYSCUS PECTORALIS PECTORALIS, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 59.
Jalpan, Queretaro, Mexico.

124. PEROMYSCUS PECTORALIS EREMICOIDES, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 60.
Mapimi, Durango, Mexico.

125. PEROMYSCUS PECTORALIS LACEIANUS, Bailey
1906. Proc. Biol. Soc. Washington, XIX, p. 57.
Lacey Ranch, near Kerrville, Kerr County, Texas.

truei Group

126. PEROMYSCUS TRUEI TRUEI, Shufeldt
1886. Proc. U.S. Nat. Mus. (1885), VIII, p. 407.
Fort Wingate, McKinley County, New Mexico.
Synonym: *megalotis*, Merriam, 1890, North Amer. Fauna, no. 3, p. 63. Black Tank, Little Colorado Desert, Arizona.
montipinoris, Elliot, 1904, Field Columb. Mus. pub. 90, z.s. 3, p. 264. California.
lasius, Elliot, same reference, p. 265. California.

127. PEROMYSCUS TRUEI GILBERTI, Allen
1893. Bull. Amer. Mus. Nat. Hist. V, p. 188.
Bear Valley, San Benito County, California.
Synonym: *dyselius*, Elliot, 1898, Field Columb. Mus. pub. 27, z.s. 1, p. 207. Portola, San Mateo County, California.

128. PEROMYSCUS TRUEI MARTIRENSIS, Allen
1893. Bull. Amer. Mus. Nat. Hist. V, p. 187.
San Pedro Martir Mountains, Lower California.
Synonym: *hemionotus*, Elliot, 1903, Field Columb. Mus. pub. 74, z.s. 3, p. 157.

129. PEROMYSCUS TRUEI LAGUNAE, Osgood
1909. North Amer. Fauna, no. 28, p. 172.
La Laguna, Sierra Laguna, Lower California.

130. PEROMYSCUS TRUEI GRATUS, Merriam
1898. Proc. Biol. Soc. Washington, XII, p. 123.
Tlalpam, Federal district, Mexico.
Synonym: *zelotes*, Osgood, 1904, Proc. Biol. Soc. Washington, XVII, p. 67. Querendaro, Michoacan, Mexico.
sagax, Elliot, 1903, Field Columb. Mus. pub. 71, z.s. 3, p. 142. Patzcuaro, Michoacan, Mexico.
pavidus, Elliot, same reference, p. 142. Same locality.

131. PEROMYSCUS TRUEI GENTILIS, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 61.
Lagos, Jalisco, Mexico.

132. PEROMYSCUS NASUTUS NASUTUS, Allen
1891. Bull. Amer. Mus. Nat. Hist. III, p. 299.
Estes Park, Larimer County, Colorado.

133. PEROMYSCUS NASUTUS GRISEUS, Benson
1932. Univ. Cal. Pub. Zool. 38, p. 338.
Malpais, 3½ miles west of Carrizozo, Lincoln County, New Mexico.

134. PEROMYSCUS POLIUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 61.
Colonia Garcia, Chihuahua, Mexico.

135. PEROMYSCUS DIFFICILIS DIFFICILIS, Allen

1891. Bull. Amer. Mus. Nat. Hist. III, p. 298.
Sierra de Valparaiso, Zacatecas, Mexico.

136. PEROMYSCUS DIFFICILIS AMPLUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 62.
Coixtlahuaca, Oaxaca, Mexico.

137. PEROMYSCUS DIFFICILIS FELIPENSIS, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 122.
Cerro San Felipe, Oaxaca, Mexico.

138. PEROMYSCUS BULLATUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 63.
Perote, Vera Cruz, Mexico.

melanophrys Group

139. PEROMYSCUS MELANOPHRYS MELANOPHRYS, Coues

1874. Proc. Acad. Nat. Sci. Philadelphia, p. 181.
Santa Efigenia, Oaxaca, Mexico.
Synonym: *leucurus*, Thomas, 1894, Ann. Mag. Nat. Hist. 6, XIV, p. 364. Tehuantepec, Oaxaca, Mexico.
gadovii, Thomas, 1903, Ann. Mag. Nat. Hist. 7, XI, p. 484
San Carlos = Yuatepec, Oaxaca.

140. PEROMYSCUS MELANOPHRYS ZAMORAE, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 65.
Zamora, Michoacan, Mexico.

141. PEROMYSCUS MELANOPHRYS CONSOBRINUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 66.
Berriozabel, Zacatecas, Mexico.

142. PEROMYSCUS XENURUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 67.
Durango, State of Durango, Mexico.

143. PEROMYSCUS MEKISTURUS, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 124.
Chalchicomula, Puebla, Mexico.

lepturus Group

144. PEROMYSCUS LEPTURUS, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 118.
Mt. Zempoaltepec, Oaxaca, Mexico.

145. PEROMYSCUS LOPHURUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 72.
Todos Santos, Guatemala.

146. PEROMYSCUS SIMULATUS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 72.
Near Jico, Vera Cruz, Mexico.

147. PEROMYSCUS GUATEMALENSIS GUATEMALENSIS, Merriam
1898. Proc. Biol. Soc. Washington, XII, p. 118.
Todos Santos, Guatemala.

148. PEROMYSCUS GUATEMALENSIS TROPICALIS, Goodwin
1932. Amer. Mus. Nov. 560, p. 3.
Chimoxan, Guatemala.

149. PEROMYSCUS NUDIPES, Allen
1891. Bull. Amer. Mus. Nat. Hist. III, p. 213.
La Carpintera, Costa Rica.
Synonym: *cacabatus*, Bangs, 1902, Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 29. Chiriqui, Panama.

150. PEROMYSCUS FURVUS, Allen & Chapman
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 201.
Jalapa, Vera Cruz, Mexico.

151. PEROMYSCUS ALTILANEUS, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 74.
Todos Santos, Guatemala.

mexicanus Group

152. PEROMYSCUS MEXICANUS MEXICANUS, Saussure
1860. Rev. et Mag. de Zool. 2, XII, p. 103.
Mexico, assumed to be the vicinity of Mirador, Vera Cruz.
Synonym: *tehuantepecus*, Merriam, 1898, Proc. Biol. Soc. Washington, XII, p. 122. Tehuantepec, Oaxaca, Mexico.

153. PEROMYSCUS MEXICANUS TOTONTEPECUS, Merriam
1898. Proc. Biol. Soc. Washington, XII, p. 120.
Totontepec, Oaxaca, Mexico.
Synonym: *orizabae*, Merriam, 1898, Proc. Biol. Soc. Washington, XII, p. 121. Orizaba, Vera Cruz.

154. PEROMYSCUS MEXICANUS SAXATILIS, Merriam
1898. Proc. Biol. Soc. Washington, XII, p. 121.
Jacaltenango, Huchuetenango, Guatemala.
Synonym: *nicaraguae*, Allen, 1908, Bull. Amer. Mus. Nat. Hist. XXIV, p. 658. Matagalpa, Nicaragua.

155. PEROMYSCUS MEXICANUS GYMNOTIS, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 365.
Guatemala.

156. PEROMYSCUS MEXICANUS TEAPENSIS, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 69.
Teapa, Tabasco, Mexico.

157. PEROMYSCUS MEXICANUS PHILOMBRIUS, Dickey
1928. Proc. Biol. Soc. Washington, XLI, p. 3.
Los Esesmiles, Dept. Chalatenango, El Salvador.

158. PEROMYSCUS MEXICANUS SALVADORENSIS, Dickey
1928. Proc. Biol. Soc. Washington, XLI, p. 4.
Mt. Cacaguatique, Dept. San Miguel, El Salvador.

159. PEROMYSCUS ALLOPHYLUS, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 71.
Huehuetan, Chiapas, Mexico.

160. PEROMYSCUS BANDERANUS BANDERANUS, Allen
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 51.
Valle de Banderas, Nayarit, Mexico.

161. PEROMYSCUS BANDERANUS VICINIOR, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 68.
La Salada, Michoacan, Mexico.

162. PEROMYSCUS BANDERANUS ANGELENSIS, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 69.
Puerto Angel, Oaxaca, Mexico.

163. PEROMYSCUS YUCATANICUS YUCATANICUS, Allen & Chapman
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 8.
Chichenitza, Yucatan, Mexico.

164. PEROMYSCUS YUCATANICUS BADIUS, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 70.
Apazote, Campeche, Mexico.

165. PEROMYSCUS STIRTONI, Dickey
1928. Proc. Biol. Soc. Washington, XLI, p. 5.
Rio Goascoran, Dept. la Union, El Salvdaor.

megalops Group

166. PEROMYSCUS MEGALOPS MEGALOPS, Merriam
1898. Proc. Biol. Soc. Washington, XII, p. 119.
Mountains near Ozolotepec, Oaxaca, Mexico.

167. PEROMYSCUS MEGALOPS AURITUS, Merriam
1898. Proc. Biol. Soc. Washington, XII, p. 119.
Mountains 15 miles west of Oaxaca, Mexico.
Synonym: *comptus*, Merriam, 1898. Proc. Biol. Soc. Washington, XII, p. 120. Near Chiplancingo, Guerrero, Mexico.

168. PEROMYSCUS MEGALOPS MELANURUS, Osgood
1909. North Amer. Fauna, no. 28, p. 215.
Pluma, Oaxaca, Mexico.

169. PEROMYSCUS MELANOCARPUS, Osgood
1904. Proc. Biol. Soc. Washington, XVII, p. 73.
Mt. Zempoaltepec, Oaxaca, Mexico.

170. PEROMYSCUS ZARHYNCHUS, Merriam
1898. Proc. Biol. Soc. Washington, XII, p. 117.
Tumbala, Chiapas, Mexico.
Synonym: *cristobalensis*, Merriam, 1898, Proc. Biol. Soc. Washington, XII, p. 117. San Cristobal, Chiapas, Mexico.

171. PEROMYSCUS GRANDIS, Goodwin
1932. Amer. Mus. Nov. 560, p. 4.
Finca Concepcion, Guatemala.

Subgenus *Megadontomys*, Merriam

172. PEROMYSCUS THOMASI, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 116.
Mountains near Chilpancingo, Guerrero, Mexico.

173. PEROMYSCUS NELSONI, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 116.
Jico, Vera Cruz, Mexico.

174. PEROMYSCUS FLAVIDUS, Bangs

1902. Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 27.
Boquete, south slope of Volcan de Chiriqui, Panama.

175. PEROMYSCUS PIRRENSIS, Goldman

1912. Smiths. Misc. Coll. LX, 2, p. 5.
Head of Rio Limon, Mt. Pirri, E. Panama.

Subgenus *Ochrotomys*, Osgood

176. PEROMYSCUS NUTTALLI NUTTALLI, Harlan

1832. Monthly Amer. Journ. Geol. & Nat. Sci. Philadelphia, 1, p. 446.
Norfolk, Norfolk County, Virginia.

177. PEROMYSCUS NUTTALLI AUREOLUS, Audubon & Bachman

1841. Proc. Acad. Nat. Sci. Philadelphia, 1, p. 98.
In the oak forests of S. Carolina.

Subgenus *Podomys*, Osgood

178. PEROMYSCUS FLORIDANUS, Chapman

1889. Bull. Amer. Mus. Nat. Hist. II, p. 117.
Gainesville, Alachua County, Florida.
Synonym: *macropus*, Merriam, 1890, North Amer. Fauna, no. 4, p. 53.
Lake Worth, Palm Beach County, Florida.

Genus 16. BAIOMYS, True

1894. Baiomys, True, Proc. U.S. Nat. Mus. XVI, 1893, p. 758.

Type Species.—*Hesperomys taylori*, Thomas.

Range.—Texas, Mexico, Honduras.

Number of Forms.—Eight.

Characters.—Interorbital constriction apparently less marked than in *Peromyscus*; rostrum short, and nasals not projecting over incisors; palatal foramina about reaching to toothrows; zygomatic plate as in *Peromyscus*; coronoid process not reduced; zygoma slender. Upper incisors relatively heavy. Front cusp of M.1 evidently divided; subsidiary ridges of molars not developed in any seen. Cusps alternating, in upper molars, as in *Peromyscus*. M.3 strongly reduced, more or less ring-shaped with wear.

Size very small (about 76 mm. head and body or less in those seen); tail shorter than head and body (rather less than three-quarters head and body length); hindfeet normal; plantar pads six; ears rather small.

This genus was considered as a subgenus of *Peromyscus* by Osgood, in his revision of that genus (North Amer. Fauna, no. 28, 1909), but is given generic rank by Miller and other American authors. It seems to be considerably distinct from *Peromyscus*, and may perhaps be a northern representative of *Hesperomys* or one of the small South American genera.

Forms seen: *brunneus*, *musculus*, *taylori*.

List of Named Forms

(Revised, as a subgenus of *Peromyscus*, by Osgood, North Amer. Fauna, no. 28, 1909.)

1. BAIOMYS TAYLORI TAYLORI, Thomas

1887. Ann. Mag. Nat. Hist. 5, XIX, p. 66.
San Diego, Duval County, Texas.

2. BAIOMYS TAYLORI SUBATER, Bailey

1905. North Amer. Fauna, no. 25, p. 102.
Bernard Creek, near Columbia, Brazoria County, Texas.

3. BAIOMYS TAYLORI PAULUS, Allen

1903. Bull. Amer. Mus. Nat. Hist. XIX, p. 598.
Rio Sestin, N.-W. Durango, Mexico.
Synonym: *allex*, Osgood, 1904, Proc. Biol. Soc. Washington, XVII, p. 76. Colima, Mexico.

4. BAIOMYS TAYLORI ANALOGUS, Osgood

1909. North Amer. Fauna, no. 28, p. 256.
Zamora, Michoacan, Mexico.

5. BAIOMYS MUSCULUS MUSCULUS, Merriam

1892. Proc. Biol. Soc. Washington, VII, p. 170.
Near City of Colima, State of Colima, Mexico.

6. BAIOMYS MUSCULUS BRUNNEUS, Allen & Chapman

1897. Bull. Amer. Mus. Nat. Hist. IX, p. 203.
Jalapa, Vera Cruz, Mexico.

7. BAIOMYS MUSCULUS NIGRESCENS, Osgood

1904. Proc. Biol. Soc. Washington, XVII, p. 76.
Valley of Comitan, Chiapas, Mexico.

8. BAIOMYS MUSCULUS GRISESCENS, Goldman

1932. Proc. Biol. Soc. Washington, XLV, p. 121.
Comayabuela, just south of Tegucigalpa, Honduras.

Genus 17. CALOMYSCUS, Thomas

1905. Calomyscus, Thomas, Abstr. Proc. Zool. Soc. London, No. 24, p. 23.

Type Species.—*Calomyscus bailwardi*, Thomas.

Range.—Persia, Baluchistan, Mesopotamia (Vinogradov), South Russian Turkestan (Kopet-Dag).

Number of Forms.—Two. (Revised by Argyropulo, 1933, Zeitschr. für Säugetierk. 8, Heft 3, p. 133.)

CHARACTERS.—Skull very like *Peromyscus*; braincase broad and rather flat; zygomatic plate straight anteriorly; nasals projecting forwards over the incisors; pterygoid fossae unusually flat. Palatal foramina shorter than in *Peromyscus*, not approaching M.1 in any seen. Bullae rather small. Coronoid process thin, but not shortened. Jugal long for a Murine, and rather broad.

Upper cheekteeth simpler than in *Peromyscus*; the cusps low, the pattern almost one of alternating triangles. M.3 extremely reduced, ring-shaped and completely simple in all seen, and as figured by Argyropulo in young, adult, and old animals. Lower cheekteeth not abnormal; usually two folds each side of M.1 and M.2, these alternating; M.3 simple. The cusps apparent.

Mammae 6. No cheekpouches (Argyropulo). Ear large. Hindfoot narrow, long, with normal digits. Tail thickly haired, heavily tufted, and longer than head and body in all specimens examined.

Forms seen: *bailwardi*, "*baluchi*," *hotsoni*, "*mystax*."

LIST OF NAMED FORMS

1. CALOMYSCUS BAILWARDI BAILWARDI, Thomas

1905. Abstr. Proc. Zool. Soc. London, no. 24, p. 23; and 1905, Proc. Zool. Soc. London, pp. 524–6.
Mala-i-mir, 70 miles north-east of Ahwaz, Persia.
Synonym: *baluchi*, Thomas, 1920, Journ. Bombay Nat. Hist. Soc. XXVI, p. 939. Kelat, Baluchistan.

2. CALOMYSCUS BAILWARDI HOTSONI, Thomas

1920. Journ. Bombay Nat. Hist. Soc. XXVI, p. 939.
Panjur district, Baluchistan.
Synonym: *mystax*, Kashkarov, 1925, Trans. Sci. Soc. Turkestan, 2, p. 43. Great Balhany Mountains, Transcaspia.

Genus 18. ONYCHOMYS, Baird

1857. ONYCHOMYS, Baird, Mamm. North Amer. p. 458.

TYPE SPECIES.—*Hypudaeus leucogaster*, Wied.

RANGE.—North America: Alberta, Saskatchewan; North Dakota; Oregon, Idaho, Utah, California, Lower California, Arizona, Kansas, New Mexico, Oklahoma, Texas, Mexico (Sonora, Chihuahua, Tamaulipas, Zacatecas). Range maps published by Hollister, and in Anthony, Field Book North American Mammals, 1928.

NUMBER OF FORMS.—Twenty-three.

CHARACTERS.—Skull with considerable interorbital constriction, and evidently (very few seen) not developing supraorbital ridges. Mandible with well-developed coronoid process. Zygoma narrow; bullae rather small; palate extending to slightly behind M.3. Palatal foramina well open, about extending to M.1. Nasals wedge-shaped posteriorly, extending behind the nasal branch of maxillae. Zygomatic plate narrow, straight anteriorly.

Cheekteeth differing from both those of *Cricetus* and *Peromyscus* clearly;

the cusps unusually high and raised and prominent in all seen; M.3 small, reduced, main outer folds lacking subsidiary ridges; the pits separating cusps not isolated and not apparent. Even in comparative old age the cusps are prominent. The cusps are slightly alternating, less so than in *Peromyscus*; there is one cusp at front end of M.1, which is divided when unworn into two or three small cusps.

The folds between the cusps are deep, and the teeth are narrowed, with cusps close together. M.1 lower with five cusps and posterointernal heel; M.2 with four cusps and posterointernal heel, and small anteroexternal fold; M.3 bilaminate, strongly reduced, the lower molars more *Cricetus*-like.

Form specialized, Hamster-like. Fur soft. Feet with digits normal, but sole furred, and plantar pads reduced to four. Mammae 1—2=6 (Hollister). Ear relatively small. Tail reduced, sometimes strongly so; apparently not much over half head and body length normally, relatively well haired. Foreclaws prominent in those seen. I have no notes as to whether this genus possesses cheekpouches or not. The hindfoot appears shortened, and the hallux is reduced.

It has been suggested that this genus is the American representative of *Cricetulus*, but I do not think the two genera have anything in common except parallel evolution in external characters. The cheekteeth are totally different in the two genera.

Forms seen: *arcticeps*, *leucogaster*, *longipes*, *torridus*.

The genus was revised by Hollister, 1914, Proc. U.S. Nat. Mus. XLVII, p. 427.

List of Named Forms

1. ONYCHOMYS LEUCOGASTER LEUCOGASTER, Wied

1841. Reise in das innere Nord. Amerika, vol. 2, p. 99.
Fort Clark, near present town of Stanton, Mercer County, N. Dakota.
Synonym: *leucogaster pallidus*, Herrick, 1885, Geol. & Nat. Hist. Surv. Minnesota, 13th Ann. Rep. 1884, p. 183.

2. ONYCHOMYS LEUCOGASTER MISSOURIENSIS, Audubon & Bachman

1851. North Amer. Quad. vol. 2, p. 327.
Fort Union, near present town of Buford, Williams County, N. Dakota.

3. ONYCHOMYS LEUCOGASTER ARCTICEPS, Rhoads

1898. Proc. Acad. Nat. Sci. Philadelphia, p. 194.
Clapham. Union County, New Mexico.

4. ONYCHOMYS LEUCOGASTER BREVICAUDUS, Merriam

1891. North Amer. Fauna, no. 5, p. 52.
Blackfoot, Bingham County, Idaho.

5. ONYCHOMYS LEUCOGASTER FUSCOGRISEUS, Anthony

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 11.
Ironside, Malheur County, Oregon.

6. ONYCHOMYS LEUCOGASTER MELANOPHRYS, Merriam

1889. North Amer. Fauna, no. 2, p. 2.
Kanab, Kane County, Utah.
Synonym: *pallescens*, Merriam, 1890, North Amer. Fauna, no. 3, p. 61. Moki Pueblos, Navaho County, Arizona.

7. ONYCHOMYS LEUCOGASTER FULIGINOSUS, Merriam

1890. North Amer. Fauna, no. 3, p. 60.
Black Tank lava beds north-east of San Francisco Mountain, Coconino County, Arizona.

8. ONYCHOMYS LEUCOGASTER RUIDOSAE, Stone & Rehn

1903. Proc. Acad. Nat. Sci. Philadelphia, p. 22.
Ruidoso, Lincoln County, New Mexico.

9. ONYCHOMYS LEUCOGASTER CAPITULATUS, Hollister

1913. Proc. Biol. Soc. Washington, XXVI, p. 215.
Lower end of Prospect Valley, Hualpai Indian Reservation, Grand Canyon, Arizona.

10. ONYCHOMYS LEUCOGASTER ALBESCENS, Merriam

1904. Proc. Biol. Soc. Washington, XVII, p. 124.
Samalayuca, Chihuahua, Mexico.

11. ONYCHOMYS LEUCOGASTER LONGIPES, Merriam

1889. North Amer. Fauna, no. 2, p. 1.
Concho County, Texas.

12. ONYCHOMYS LEUCOGASTER BREVIAURITUS, Hollister

1913. Proc. Biol. Soc. Washington, XXVI, p. 216.
Fort Reno, Canadian County, Oklahoma.

13. ONYCHOMYS TORRIDUS TORRIDUS, Coues

1874. Proc. Acad. Nat. Sci, Philadelphia, p. 183.
Camp Grant, Graham County, Arizona.
Synonym: *torridus arenicola*, Mearns, 1896, Advance Sheet Proc. U.S. Nat. Mus. XVIII, p. 3. Texas.

14. ONYCHOMYS TORRIDUS PERPALLIDUS, Mearns

1896. Advance Sheet Proc. U.S. Nat. Mus. XVIII, p. 4.
Left bank of Colorado River at monument no. 204 Mexican boundary line, Yuma County, Arizona.

15. ONYCHOMYS TORRIDUS PULCHER, Elliot

1903. Field Columb. Mus. pub. 87, zool. ser. 3, p. 243.
Morongo Pass, San Bernardino Mountains, California.

16. ONYCHOMYS TORRIDUS LONGICAUDUS, Merriam

1889. North Amer. Fauna, no. 2, p. 2.
St. George, Washington County, Utah.

17. ONYCHOMYS TORRIDUS CLARUS, Hollister

1913. Proc. Biol. Soc. Washington, XXVI, p. 215.
Keeler, east shore of Owen's Lake, Inyo County, California.

18. ONYCHOMYS TORRIDUS TULARENSIS, Merriam

1904. Proc. Biol. Soc. Washington, XVII, p. 123.
Bakersfield, Kern County, California.

19. ONYCHOMYS TORRIDUS RAMONA, Rhoads

1893. Amer. Nat. XXVII, p. 833.
San Bernardino Valley, California.

20. ONYCHOMYS TORRIDUS MACROTIS, Elliot

1903. Field Columb. Mus. pub. 74, zool. ser. 3, p. 155.
Head of San Antonio River, Lower California.

21. ONYCHOMYS TORRIDUS YAKIENSIS, Merriam

1904. Proc. Biol. Soc. Washington, XVII, p. 124.
Camoa, Rio Mayo, S. Sonora, Mexico.

22. ONYCHOMYS TORRIDUS CANUS, Merriam

1904. Proc. Biol. Soc. Washington, XVII, p. 124.
San Juan Capistrano, Zacatecas, Mexico.

23. ONYCHOMYS TORRIDUS SURRUFUS, Hollister

1914. Proc. U.S. Nat. Mus. XLVII, p. 472.
Miquihuana, Tamaulipas, Mexico.

Genus 19. AKODON, Meyen

1833. Akodon, Meyen, Nova. Acta Acad. Leop. xvi, pt. 11, p. 599.
1916. Chalcomys, Thomas, Ann. Mag. Nat. Hist. 8, XVIII, p. 338. (*Akodon aerosus*, Thomas.)
1916. Chrœomys, Thomas, Ann. Mag. Nat. Hist. 8, XVIII, p. 340. (*Akodon pulcherrimus*, Thomas.) Valid as a subgenus.
1916. Thalpomys, Thomas, Ann. Mag. Nat. Hist. 8, XVIII, p. 339. (*Mus lasiotis*, Lund.) Valid as a subgenus.
1917. Deltamys, Thomas, Ann. Mag. Nat. Hist. 8, XX, p. 98. (*Deltamys kempi*, Thomas.) Valid as a subgenus.
1918. Hypsimys, Thomas, Ann. Mag. Nat. Hist. 9, I, p. 190. (*Hypsimys budini*, Thomas.) Valid as a subgenus.
1916. Thaptomys, Thomas, Ann. Mag. Nat. Hist. 8, XVIII, p. 339. (*Hesperomys subterraneus*, Hensel.) Valid as a subgenus.
1916. Bolomys, Thomas, Ann. Mag. Nat. Hist. 8, XVIII, p. 339. (*Akodon amoenus*, Thomas.) Valid as a subgenus.
1837. Abrothrix, Waterhouse, Proc. Zool. Soc. London, p. 21. (*Mus longipilis*, Waterhouse.) Valid as a subgenus.

Type Species.—*Akodon boliviensis*, Meyen.

Range.—South America: Venezuela, Colombia, Peru, Ecuador, Brazil, Bolivia, Argentine, Chile, Uruguay, Paraguay, Patagonia.

Number of Forms.—Approximately eighty-five.

Characters.—In the typical subgenus, and in the whole genus excepting *Thalpomys* and sometimes *Chrœomys*, the interparietal tends to be strongly reduced. Interorbital region comparatively broad, with or without supraorbital ridges, which when present are weak. Zygomatic plate narrow, but cut back above, and not slanting gradually backwards from lower to upper border (compare *Microxus*). Rostrum generally rather short. Incisive foramina as a rule extending to posterior molars, or slightly behind them. Coronoid process moderate or low; bullae small or medium, or in some forms, e.g., *Chrœomys* and to a lesser extent in *Bolomys*, tending to be enlarged.

Upper molars: cusps more or less opposite; M.3 much reduced, often ring-shaped in adult. The usual number of folds present in M.1 and M.2; these folds are not persistent, but are shallow, and with wear may be obliterated; subsidiary ridges normally at least traceable in the young or young-adult specimen; sometimes lost in adult; but I have seen no specimens of the species *lenguarum* and *obscurus* with these ridges and suspect that these species may have to be transferred to *Zygodontomys*; *obscurus* has pro-odont upper incisors. The whole dentition is simpler, rather more hypsodont, and with the molars narrower and with cusps rather closer together than in *Oryzomys* and allied genera; compared with *Hesperomys*, the folds tend to be less curved, extending less far into the teeth, and with no signs of tendency for the folds to cut the cusp areas into partly closed triangles. In the lower molars, M.3 may be relatively large; the pattern is usually complex (about normal), but many of the original folds are lost in adult.

The subgenus *Chalcomys* of Thomas, based on colour pattern and small differences in the skull (braincase said to be larger, interorbital region broader) appears quite unretainable. I have listed these forms as the *urichi* group. Tail more than half head and body length to slightly shorter than this measurement; poorly haired in the *urichi* group, usually moderately or well haired in the other species. Digits not abnormal. Fur soft or medium. In the type species, the ear appears to be as reduced as in subgenus *Thaptomys*; in most other forms it is moderate. The foreclaws becoming enlarged in *jucundus*, *tucumanensis*, *obscurus* and others, as pointed out by Thomas when he erected the "genera" *Bolomys* and *Chrœomys* based largely on this character; three species at least of typical *Akodon* therefore are intermediate between *Akodon* and these subgenera in this character.

In 1916 Thomas (Ann. Mag. Nat. Hist. 8, XVIII, p. 336) divided this genus into six genera (*Zygodontomys* being currently accepted as a genus), and keyed them as follows:

Supraorbital edges more or less squared.
  Claws normal. Bullae not enlarged.
    Form unmodified; tail length medium; eyes not reduced.
      Supraorbital edges square or beaded, without overhanging ledges.
        Supraorbital edge beaded. M.1 without notch on anterior face. ZYGODONTOMYS
        Supraorbital edge not or scarcely beaded. M.1 with notch on anterior face. AKODON
      Supraorbital edges with overhanging ledges. THALPOMYS
    Form *Pitymys*-like. Tail short. Eyes reduced. THAPTOMYS
  Claws elongated. Interorbital region broad, with squared edges. Bullae enlarged. BOLOMYS
Supraorbital edges rounded.
  Snout not elongated. Foreclaws long. Bullae large. A specialized colour pattern. CHRŒOMYS
  Snout elongated. Foreclaws not lengthened. Bullae normal. No colour pattern. ABROTHRIX

He also gave characters to all genera regarding the presence or absence of the notch on the anterior face of M.1, which have subsequently been found to be inconstant.

It will be seen that all these "genera" are based on the shape of the supraorbital edges. While this is quite constant, it is not a sufficiently important character on which to base generic names; and certainly elsewhere, as for instance within *Oryzomys*, and within *Rattus*, just as many different kinds of skull characters will be observed on working through the groups, or more. None of the above groups have really enlarged foreclaws, the claws of *Chrœomys* and *Bolomys* being puny compared with those of really fossorial genera like *Chelemyscus* and *Notiomys*. The bullae of *Chrœomys* compare with those of *Akodon* much as do those of *Cricetulus* with its subgenus *Tscherskia*; in some forms of *Bolomys*, the bullae seem to be clearly rather small, as small or smaller than those of many *Akodon*. It will be seen from the above key that *Bolomys* and *Chrœomys* agree in essential characters, and differ only in colour and shape of interorbital region. And in *Akodon* s.s. are three forms, noted above, with claws almost as large as those of *Chrœomys* and *Bolomys*.

Within other genera of Cricetinae, revised it must be admitted, there are groups regarded as subgenera only by their revisers and currently accepted as such, which are just as distinct as any of the above (and much more so than some). One need only mention *Peromyscus*, with its subgenera *Megadontomys* and *Haplomylomys*; *Oryzomys*, with its subgenera *Melanomys*, *Microryzomys*, and (when the genus is revised) *Oecomys*; *Reithrodontomys*, with its subgenus *Aporodon*; *Neotoma*, with its subgenus *Teonoma*; and *Cricetulus*, with its subgenera *Allocricetulus* and *Tscherskia*. If these subgenera are retained as such, most certainly none of the groups above can stand as full genera (excepting *Zygodontomys*, which has always been regarded as a genus distinct; but even here there are intermediate forms). It may be noted that it is no easy matter to frame definitions for the majority of these large South American genera. They are all obviously closely allied, and offshoots of one essential stock; the characters of the cheekteeth tend to vary individually, and with age; their skulls and external characters grade for the most part from group to group. Many species, proving this statement, have been referred in the past to entirely different genera from those they are now classified in; an interesting case is "*Oryzomys*" *microtinus*, of Thomas (1894), Ann. Mag. Nat. Hist. 6, XIV, p. 358, and "*Akodon*" *punctulatus*, same reference, p. 361, both of which are now referred to *Zygodontomys*. It seems certainly most convenient and consistent, in circumstances such as these, to recognize as few genera as is possible. Groups like the above which have been divided off in large batches from the parent genus give the impression of being little more than valid species. I am not prepared to say that the teeth of *Akodon* itself are in every case distinguishable from *Hesperomys*, *Zygodontomys*, or even sometimes *Phyllotis*; all of these have reached a roughly similar stage in development, and they are not easily distinguished from each other. Thomas at one time suggested, in fact, that all the American Cricetinae except *Neotoma* should be referred to the genus *Cricetus*; later he thought better of the fact and erected no less than thirty-one new genera in the group. After a few weeks of endeavouring to differentiate between these numerous groups of Neotropical Cricetine Mice one is tempted to believe that his original proposal is perhaps the correct one!

In addition to the above-mentioned groups, I include in *Akodon* two "genera" of Thomas subsequently named *Deltamys* and *Hypsimys*.

I have for the present retained all these forms as subgenera. I think that when *Akodon* is properly revised more than one of these names will disappear into synonymy.

Thalpomys contains a little-known Mouse from Lagoa Santa; the supraorbital ridges are quite strong; the interparietal is large. Apart from this it does not seem to have any special characters, but it is represented by only one broken skull in London.

Deltamys contains a distinct species from Eastern Argentina, with much narrowed skull, and without supraorbital ridges. The mesopterygoid is rather broad, but not more so than in some *Akodon*. The anteroexternal subsidiary ridge and fold of M.2 are weak. The skull is certainly not more narrowed and aberrant than is the *Stenocranius* subgenus of *Microtus*, and I do not think this is more than a well-differentiated *Akodon*.

Hypsimys contains two forms from North-west Argentina. The cheekteeth are said to be more hypsodont than in *Akodon*, with differences also in the roots, "M.1 has one anterior root, one inner, one posteroexternal, the usual median external one practically obsolete." Young specimens show clear subsidiary ridges, and are quite complex dentally, but the adult is simpler-toothed. I am not persuaded that there is any generic difference between this group and some more hypsodont *Akodon*, like *neocenus*. Within the genus *Notiomys*, for instance, exist two types of dentition which seem to me to differ more from each other than do *Akodon* and *Hypsimys*. The first lower molar tends to be complex. The form is normal.

Thaptomys with two forms from Southern Brazil has a rather short rostrum; the zygomatic plate is nearly straight anteriorly. The cheekteeth are rather more simple than is usual in *Akodon*. The external form is slightly modified for fossorial life; the tail is moderately shortened; poorly haired. The ear is short (about an eighth head and body length), but *Akodon boliviensis* appears to be similar in this character. The claws are prominent, but not extreme.

This is quite a well differentiated group. The fossorial specialization is negligible compared, for instance, with such types as *Blarinomys*, however.

Abrothrix from Chile and Argentine differs from the above in the interorbital region, which is more rounded, with more abrupt constriction. The interparietal is, as in the normal forms of the genus, much reduced. The rostrum is rather long. The zygomatic plate is almost straight. The nasals project forwards over the incisors. Bullae not enlarged. Cheekteeth of complex-*Akodon* type; M.3 often with an isolated island. External form not peculiar.

Bolomys, from Southern Peru, Bolivia, and Northern Argentina, is a well-differentiated group. The rostrum is short. The bullae are typically more enlarged than in *Akodon*, but not so in *lactens* and *orbus*. In these forms, the incisors are pro-odont. They are even more so in the form *negrito*, which is thought not to be a valid species by Gyldenstolpe, but which seems to be so on this character. Otherwise the skull characters are much as in *Akodon*. The claws are enlarged, but not extremely so.

Chroeomys, from the same area as *Bolomys*, differs in the shape of the interorbital region, which is more as in *Abrothrix*, and the constancy of the enlargement of the bullae. The interparietal may be largish or strongly reduced, and evidently varies. Foreclaws about as *Bolomys*. Tail well haired. A specialized colour pattern present in *pulcherrimus*, one of the most attractive of all South American Cricetinae, also (but differing from *pulcherrimus*) in *bacchante*. The form *jelskii* is most sober of those seen, in coloration.

Mammae 2—2=8, according to Gyldentolpe, in *Akodon*, *Bolomys*, *Chraeomys*, *Thaptomys*.

Forms seen: *alterus*, *altorum*, *arviculoides*, *arenicola*, *aerosus*, *amoenus*, *albiventer*, *benefactus*, *bacchante*, *beatus*, *berlepschii*, *boliviensis*, *baliolus*, *brachyotis*, *budini*, *canescens*, *cursor*, *cayllomae*, *cruceri*, *coenosus*, *collinus*, *deceptor*, *dolores*, *dayi*, *fumeus*, *francei*, *glaucinus*, *gossei*, *hirtus*, *hunteri*, *henseli*, *illutea*, *inambarii*, *iniscatus*, *jelskii*, *jucundus*, *kempi*, *longipilis*, *lasiotis*, *lactens*, *lenguarum*, *mollis*, *modestior*, *moerens*, *montensis*, *nubila*, *negrito*, *nigrita*, *nucus*, *neocenus*, *orbus*, *obscurus*, *olivaceus*, *orophilus*, *puer*, *pacificus*, *pyrrhotis*, *pulcherrimus*, *sodalis*, *subterraneus*, *simulator*, *spegazzinii*, *serrensis*, *suffusus*, *surdus*, *sylvanus*, *toba*, *tolimae*, *tartareus*, *tucumanensis*, *torques*, *urichi*, *venezuelensis*, *varius*, *xanthorhinus*.

I think that the species "*Zygodontomys*" *lasiurus* belongs in the present genus; but that *lenguarum* and *obscurus* are very likely members of *Zygodontomys*.

The "*boliviensis* group" listed here is the *Akodon* s.s. of Thomas, but would probably subdivide into several groups if the genus were revised.

List of Named Forms

Subgenus *Akodon*, Meyen

boliviensis Group

1. AKODON ALTERUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 496.
Otro Cerro, Catamarca, N.-W. Argentina.

2. AKODON ARENICOLA ARENICOLA, Waterhouse

1837. Proc. Zool. Soc. London, p. 18.
Maldonado, Uruguay.

3. AKODON ARENICOLA BEATUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 204.
Beatriz, Lake Nahuel Huapi, Neuquen, N.-W. Patagonia.

4. AKODON ARENICOLA HUNTERI, Thomas

1917. Ann. Mag. Nat. Hist. 8, XX, p. 97.
Isla Ella, Parana Delta, Buenos Aires Province, E. Argentina.

5. AKODON ARVICULOIDES ARVICULOIDES, Wagner

1842. Archiv. für Naturgesch. viii, 1, p. 361.
Bahia, E. Brazil.
Synonym: *orobinus*, Wagner, Archiv. für Naturgesch. viii, 1, p. 361, 1842. Ypanema, São Paulo, E. Brazil.

6. AKODON ARVICULOIDES CURSOR, Winge

1888. E. Museo Lundii, 1, 3, p. 25.
Lagoa Santa, Rio das Velhas, Minas Geraes, E. Brazil.

7. AKODON ARVICULOIDES MONTENSIS, Thomas

1913. Ann. Mag. Nat. Hist. 8, XI, p. 405.
Sapucay, Paraguay.

8. AKODON BENEFACTUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 214.
Bonifacio, S.-W. Buenos Aires Province, E. Argentina.

9. AKODON BOLIVIENSIS, Meyen

1833. Nova Acta Acad. Leop. xvi, no. 2, p. 600.
Pichu Pichun, Mt. Misti, Arequipa Dept., Peru.

10. AKODON COENOSUS, Thomas

1918. Ann. Mag. Nat. Hist. 9, I, p. 189.
Leon, Jujuy, N.-W. Argentina.

11. AKODON CHACOENSIS, Shamel

1931. Journ. Washington Acad. Sci. XXI, p. 427.
Las Palmas, Chaco Territory, N. Argentina.

12. AKODON DAYI, Osgood

1916. Field. Mus. Nat. Hist. Zool. ser. X, p. 208.
Todos Santos, Rio Chapare, Bolivia,

13. AKODON DOLORES, Thomas

1916. Ann. Mag. Nat. Hist. 8, XVIII, p. 334.
Yacanto, Sierra de Villa Dolores, Cordova Province, Central Argentina.

14. AKODON GOSSEI, Thomas

1920. Ann. Mag. Nat. Hist. 9, VI, p. 418.
Puerte del Inca, Andes of Mendoza Province, Argentina.

15. AKODON INISCATUS INISCATUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 205.
Valle del Lago Blanco, Koslowsky region, Chubut, N.-W. Patagonia.

16. AKODON INISCATUS COLLINUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 206.
Maiten, Chubut, N.-W. Patagonia.

17. AKODON JUCUNDUS, Thomas

1913. Ann. Mag. Nat. Hist. 8, XI, p. 140.
Cerro de Lagunita, Maimara, Jujuy, N.-W. Argentina.

18. AKODON LENGUARUM, Thomas

1898. Ann. Mag. Nat. Hist. 7, II, p. 271.
Waikthlatingmayalwa, N. Chaco, Paraguay.
(Probably a member of the genus *Zygodontomys*.)

19. AKODON LUTESCENS, Allen

1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 46.
Tirapata, N. Peru.

20. AKODON MOLLIS MOLLIS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 363.
Tumbez, Piura district, N.-W. Peru.

21. AKODON MOLLIS ALTORUM, Thomas

1913. Ann. Mag. Nat. Hist. 8, XI, p. 404.
Canar Province, Central Ecuador.

22. AKODON MOLLIS FUMEUS, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 137.
Choro, Rio Securé, Central Bolivia.

23. AKODON MOLLIS ORIENTALIS, Osgood
1913. Field Mus. Nat. Hist. Publ. Zool. ser. X, p. 99.
Poco Tambo, Chachapoyas district, Peru.

24. AKODON MOLLIS OROPHILUS, Osgood
1913. Field Mus. Nat. Hist. Publ. Zool. ser. X, p. 98.
Leimabamba, Upper Rio Utcubamba, N. Peru.

25. AKODON NUCUS, Thomas & St. Leger
1926. Ann. Mag. Nat. Hist. 9, XVIII, p. 636.
Chos Malal, Neuquen, Patagonia.

26. AKODON OBSCURUS, Waterhouse
1837. Proc. Zool. Soc. London, p. 16.
Maldonado, Uruguay.
(Possibly a member of the genus *Zygodontomys*.)

27. AKODON OLIVACEUS, Waterhouse
1837. Proc. Zool. Soc. London, p. 16.
Valparaiso, W. Chile.
Synonym: *renggeri*, Waterhouse, 1839, Zool. Voy. Beagle Mamm. p. 51. Valparaiso, Chile.
lepturus, Philippi, 1900, An. Mus. Nac. Chile, p. 17. Peine, Santiago Province, Chile.
ruficaudus, Philippi, same reference, p. 40. Chile.
trichotis, Philippi, same reference, p. 18. Santiago Province, Chile.
vinealis, Philippi, same reference, p. 24. Valdivia.
germaini, Philippi, same reference, p. 32. Santiago Province, Chile.
nasica, Philippi, same reference, p. 38.
senilis, Philippi, same reference, p. 27. Santiago Province, Chile.

28. AKODON PACIFICUS, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 135.
La Paz, W. Bolivia.

29. AKODON PUER, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 136.
Choquecamate, Rio Securé, Bolivia.

30. AKODON PUSILLUS, Philippi
1858. Arch. für Naturgesch. XXIV, 1, p. 79.
Coast region near Valparaiso, Chile.

31. AKODON SERRENSIS SERRENSIS, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 61.
Roca Nova, Serra do Mar, E. Parana, Brazil.

32. AKODON SERRENSIS LEUCOGULA, Ribeiro
1905. Arch. Mus. Nac. do Rio de Janeiro, XIII, p. 188.
Retiro de Ramos, Serra do Itatiaya, Rio Janeiro Province, Brazil.

33. AKODON SPEGAZZINII, Thomas
1897. Ann. Mag. Nat. Hist. 6, XX, p. 216.
Lower Rio Cachi, Salta Province, N.-W. Argentina.

34. AKODON SYLVANUS SYLVANUS, Thomas
1921. Ann. Mag. Nat. Hist. 9, VII, p. 184.
Sunchal, Sierra de Santa Barbara, S.-E. Jujuy, Argentina.

35. AKODON SYLVANUS PERVALENS, Thomas
1925. Ann. Mag. Nat. Hist. 9, XV, p. 579.
Carapari, Yacuiba, Cochabamba district, S. Bolivia.

36. AKODON SURDUS, Thomas
1917. Smiths. Misc. Coll. LXVIII, no. 4, p. 2.
Huadquina, Central Peru.

37. AKODON TARTAREUS, Thomas
1919. Ann. Mag. Nat. Hist. 9, IV, p. 155.
Tartagel, Salta Province, N.-W. Argentina.

38. AKODON TOBA, Thomas
1921. Ann. Mag. Nat. Hist. 9, VII, p. 178.
Jesematathla, N. Chaco, Paraguay.

39. AKODON TUCUMANENSIS, Allen
1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 410.
Tucuman, N.-W. Argentina.

40. AKODON TORQUES, Thomas
1917. Smiths. Misc. Coll. LXVIII, no. 4, p. 3.
Machu Picchu, Cuzco district, Central Peru.

41. AKODON VARIUS VARIUS, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 134.
Cochabamba, Central Bolivia.

42. AKODON VARIUS GLAUCINUS, Thomas
1919. Ann. Mag. Nat. Hist. 9, III, p. 116.
Chumbicha, Catamarca Province, Argentina.

43. AKODON VARIUS NEOCENUS, Thomas
1919. Ann. Mag. Nat. Hist. 9, III, p. 213.
Rio Limay, Upper Rio Negro, Neuquen, W. Patagonia.

44. AKODON VARIUS SIMULATOR, Thomas
1916. Ann. Mag. Nat. Hist. 8, XVIII, p. 335.
Villa Nouges, San Pablo, Tucuman Province, N.-W. Argentina.

45. AKODON XANTHORHINUS, Waterhouse
1837. Proc. Zool. Soc. London, p. 17.
Hardy Peninsula, S. Tierra del Fuego.
Synonym: *canescens*, Waterhouse, 1837, Proc. Zool. Soc. London, p. 17. Port Desire, Santa Cruz.
infans, Philippi, 1900, Ann. Mus. Nac. Chile, p. 41.

urichi Group

46. AKODON AEROSUS AEROSUS, Thomas
1913. Ann. Mag. Nat. Hist. 8, XI, p. 406.
Mirador, Upper Rio Pastaza, S.-E. Ecuador.

47. AKODON AEROSUS BALIOLUS, Osgood

1915. Field. Mus. Nat. Hist. Publ. Zool. ser. X, p. 192.
Rio Inambari, Inca Mines, S.-E. Peru.

48. AKODON CHAPMANI, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 600.
Chipaque, Bogota region, Colombia.

49. AKODON MERIDENSIS, Allen

1904. Bull. Amer. Mus. Nat. Hist. XX, p. 329.
Merida, Venezuela.

50. AKODON TOLIMAE, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 480.
Rio Toche, Quindio Andes, Tolima district, Colombia.

51. AKODON URICHI, Allen & Chapman

1897. Bull. Amer. Mus. Nat. Hist. IX, p. 19.
Caparo, Trinidad.

52. AKODON VENEZUELENSIS, Allen

1899. Bull. Amer. Mus. Nat. Hist. XII, p. 203.
Quebrada Secca, Cumana district, N. Venezuela.

Subgenus *Deltamys*, Thomas

53. AKODON KEMPI, Thomas

1917. Ann. Mag. Nat. Hist. 8, XX, p. 98.
Isla Ella, Parana Delta, Buenos Aires Province, Argentina.

Subgenus *Hypsimys*, Thomas

54. AKODON BUDINI, Thomas

1918. Ann. Mag. Nat. Hist. 9, I, p. 190.
Leon, Jujuy, N.-W. Argentina.

55. AKODON DECEPTOR, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 613.
Higuerilla, Valle Grande Dept. Jujuy, Argentina.

Subgenus *Thalpomys*, Thomas

56. AKODON LASIOTIS, Lund

1841. K. Danske Vidensk. Selsk. Afhandl. VIII, p. 280.
Lagoa Santa, Rio das Velhas, S.-W. Minas Geraes, E. Brazil.

Subgenus *Thaptomys*, Thomas

57. AKODON NIGRITA, Lichtenstein

1830. Darstell. Neuer Säuget. vii, pl. xxxv, fig. 1.
Rio de Janeiro Province, Brazil.
Synonym: *fuliginosus*, Wagner, Arch. für Naturg. XI, 1, 1845, p. 148. Ypanema.

58. AKODON SUBTERRANEUS, Hensel

1873. Abhandl. K. Preuss. Akad. Wiss. Berlin, 1872, p. 44.
Rio Grande do Sul Province, Brazil.
Synonym: *henseli*, Leche, 1886, Zool. Jahrb. 1, p. 697.

Subgenus *Bolomys*, Thomas

59. AKODON ALBIVENTER, Thomas
1897. Ann. Mag. Nat. Hist. 6, XX, p. 217.
Lower Cachi, Salta, N.-W. Argentina.

60. AKODON AMOENUS, Thomas
1900. Ann. Mag. Nat. Hist. 7, VI, p. 468.
Calalla, Rio Colca, S. Peru.

61. AKODON BERLEPSCHII, Thomas
1898. Ann. Mag. Nat. Hist. 7, I, p. 281.
Esperanza, Mt. Sahama region, Bolivia.

62. AKODON LACTENS, Thomas
1918. Ann. Mag. Nat. Hist. 9, I, p. 188.
Leon, Jujuy, N.-W. Argentina.

63. AKODON LEUCOLIMNAEUS, Cabrera
1926. Rev. Chilena de Hist. Nat. XXX, p. 320.
Laguna Blanca, Catamarca, N.-W. Argentina.

64. AKODON NEGRITO, Thomas
1926. Ann. Mag. Nat. Hist. 9, XVII, p. 312.
Las Paras, Aconquija, Tucuman Province, N.-W. Argentina.
("Apparently only a dark-coloured or semimelanoid variety" of *A. albiventer*, *fide* Gyldenstolpe.) For note on validity of this species see p. 409.

65. AKODON ORBUS, Thomas
1919. Ann. Mag. Nat. Hist. 9, III, p. 497.
Otro Cerro, Catamarca, N.-W. Argentina.

Subgenus *Chrœomys*, Thomas

66. AKODON BACCHANTE BACCHANTE, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 138.
Choro, Rio Securé, Bolivia.

67. AKODON BACCHANTE SODALIS, Thomas
1913. Ann. Mag. Nat. Hist. 8, XI, p. 141.
Cerro de Lagunita, east of Maimara, Jujuy, Argentina.

68. AKODON INORNATUS, Thomas
1917. Smiths. Misc. Coll. LXVIII, 4, p. 2.
Ollantaytambo, Cuzco district, Peru.

69. AKODON JELSKII JELSKII, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 360.
Junin, Lima district, Peru.

70. AKODON JELSKII PYRRHOTIS, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 361.
Maraynioc, Rio Aynamayo, Peru.
(Not a valid race, *fide* Gyldenstolpe.)

71. AKODON PULCHERRIMUS PULCHERRIMUS, Thomas
1897. Ann. Mag. Nat. Hist. 6, XX, p. 549.
Puno, S.-E. Peru.

72. AKODON PULCHERRIMUS CAYLLOMAE, Thomas

1901. Ann. Mag. Nat. Hist. 7, VII, p. 185.
Caylloma, S. Peru.
(Evidently considered as not a valid race by Gyldenstolpe.)

73. AKODON PULCHERRIMUS CRUCERI, Thomas

1901. Ann. Mag. Nat. Hist. 7, VII, p. 186.
Crucero, Peru.

74. AKODON PULCHERRIMUS INAMBARII, Thomas

1901. Ann. Mag. Nat. Hist. 7, VII, p. 185.
Limbane, Upper Madre de Dios, Rio Inambari, Peru.
(Not considered a valid race by Gyldenstolpe.)

75. AKODON SCALOPS, Gay

1847. Hist. Nat. de Chile, Mamm. 1, p. 108.
Central Chile.

Subgenus *Abrothrix*, Waterhouse

76. AKODON BRACHIOTIS, Waterhouse

1837. Proc. Zool. Soc. London, p. 17.
Chonos Archipelago, Midship Bay, S.-W. Chile.

77. AKODON FRANCEI, Thomas

1908. Ann. Mag. Nat. Hist. 8, II, p. 497.
Santa Maria, Tierra del Fuego.

78. AKODON HIRTA HIRTA, Thomas

1895. Ann. Mag. Nat. Hist. 6, XVI, p. 370.
Fort San Rafael, Mendoza, W. Argentina.

79. AKODON HIRTA MOERENS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 203.
Beatriz, Lake Nahuel Huapi, Neuquen, N.-W. Patagonia.

80. AKODON HIRTA NUBILA, Thomas

1929. Ann. Mag. Nat. Hist. 10, IV, p. 40.
Estancia Alta Vista, Lago Argentino, S. Patagonia.

81. AKODON HIRTA SUFFUSA, Thomas

1903. Ann. Mag. Nat. Hist. 7, XII, p. 241.
Valle del Lago Blanco, Chubut, N.-W. Patagonia.
Synonym: *modestior*, Thomas, 1919, Ann. Mag. Nat. Hist. 9, III, 202. Maiten, Chubut.

82. AKODON ILLUTEA, Thomas

1925. Ann. Mag. Nat. Hist. 9, XV, p. 582.
Aconquija, Tucuman, N.-W. Argentina.

83. AKODON LONGIPILIS, Waterhouse

1837. Proc. Zool. Soc. London, p. 16.
Coquimbo, Central Chile.
Synonym: *dumetorum*, Philippi, 1900, An. Mus. Nac. Chile, p. 14. Valdivia Province.
brachytarsus, Philippi, same reference, p. 37. Santiago Province.
fuscoater, Philippi, same reference, p. 45.
nemoralis, Philippi, same reference, p. 49. Valdivia.
melampus, Philippi, same reference, p. 49. Valparaiso Province.

incertae sedis

84. AKODON RUPESTRIS, Gervais

1841. In Vaillant, Voy. Bonite, Zool. 1, p. 51.
Andes, Chile.

85. AKODON ORYCTER, Lund

1841. K. Danske. Vidensk. Selsk. Afhandl. VIII, p. 281.
Minas Geraes, Brazil.

Genus 20. ZYGODONTOMYS, Allen

1897. Zygodontomys, Allen, Bull. Amer. Mus. Nat. Hist. IX, p. 38.

Type Species.—*Oryzomys cherriei*, Allen.

Range.—Costa Rica, Panama; Trinidad, Venezuela, Surinam, Colombia, Ecuador, Peru, and parts of Brazil.

Number of Forms.—About seventeen.

Characters.—Interparietal as a rule well developed, rarely reduced. Supraorbital ridges usually present, rather well marked. Zygomatic plate cut back above. Jugal very short, zygoma slender. Incisive foramina broad, extending to toothrows. Bullae not enlarged. Palate as in *Oryzomys*. Upper cheekteeth relatively simpler than in *Akodon*; subsidiary ridges apparently suppressed in all cases except the form *lasiurus*, which is probably an *Akodon*. The outer folds larger than the inner ones; the folds straight; second main fold on external side of M.1 and M.2 widened. The subsidiary ridge on the anteroexternal side of M.2 is not suppressed, but this ridge is usually present in all cuspidate genera which have the other ridges absent. In old age, the teeth are nearly flatcrowned, three nearly straight laminae being present, something after the manner of *Phyllotis*, but much less prismatic and strong in general effect than in that genus. The folds are much straighter than those of *Hesperomys*. Lower molars with folds as in *Akodon*, but often more opposite.

Mammae 2—2=8. Form Ratlike. Tail poorly haired, shorter than head and body. Hindfoot with rather reduced outer digits.

Thomas was of opinion that this genus was scarcely distinguishable from *Akodon*; the differences between the two genera are not great, and it might be better to regard the present as a subgenus of *Akodon*. It is considerably more differentiated from *Akodon* than any of Thomas's subsidiary genera. It is currently given generic rank by American authors.

Forms seen: *brevicauda*, *brunneus*, *cherriei*, *lasiurus*, *microtinus*, *punctulatus*, *sanctaemartae*, *stellae*, *thomasi*, *tobagi*, *fuscinus*.

List of Named Forms

1. ZYGODONTOMYS BREVICAUDA BREVICAUDA, Allen & Chapman

1893. Bull. Amer. Mus. Nat. Hist. V, p. 215.
Princestown, Trinidad.
Synonym: *frustrator*, Allen & Chapman, 1897, Bull. Amer. Mus. Nat. Hist. IX, p. 20. Caparo, Trinidad.

2. ZYGODONTOMYS BREVICAUDA BRUNNEUS, Thomas

1898. Ann. Mag. Nat. Hist. 7, II, p. 269.
El Saibal, Cundinamarca district, Colombia.

3. ZYGODONTOMYS BREVICAUDA TOBAGI, Thomas

1900. Ann. Mag. Nat. Hist. 7, V, p. 274.
Richmond, Island of Tobago, W. Indies.

4. ZYGODONTOMYS CHERRIEI CHERRIEI, Allen

1895. Bull. Amer. Mus. Nat. Hist. VII, p. 329.
Boruca, Costa Rica.

5. ZYGODONTOMYS CHERRIEI VENTRIOSUS, Goldman

1912. Smiths. Misc. Coll. LVI, p. 8.
Tabernilla, Canal Zone, Panama.

6. ZYGODONTOMYS FRATERCULUS, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 599.
Chicoral, Rio Coèllo, Tolima district, Colombia.

7. ZYGODONTOMYS FUSCINUS, Thomas

1897. Ann. Mag. Nat. Hist. 6, XIX, p. 496.
Source, Marajó Island, N.-E. Brazil.
(Perhaps a member of *Akodon.*)

8. ZYGODONTOMYS GRISEUS, Allen

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 599.
El Triumfo, Magdalena Valley, W. Colombia.

9. ZYGODONTOMYS LASIURUS, Lund

1841. K. Danske Vidensk. Selsk. Afhandl. VIII, pp. 50, 280.
Lagoa Santa, Rio das Velhas, Minas Geraes, Brazil.
(Probably a member of the genus *Akodon.*)

10. ZYGODONTOMYS MICROTINUS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 358.
Surinam.

11. ZYGODONTOMYS OBTUSIROSTRIS, Allen

1900. Bull. Amer. Mus. Nat. Hist. XIII, p. 225.
Inca Mines, Rio Inambari, S.-E. Peru.

12. ZYGODONTOMYS PUNCTULATUS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 361.
Pallatanga, Central Ecuador.

13. ZYGODONTOMYS SANCTAEMARTAE, Allen

1899. Bull. Amer. Mus. Nat. Hist. XII, p. 207.
Bonda, Santa Marta district, Colombia.

14. ZYGODONTOMYS SEORSUS, Bangs

1901. Amer. Nat. XXXV, p. 642.
San Miguel Island, Panama.

15. ZYGODONTOMYS STELLAE, Thomas

1899. Ann. Mag. Nat. Hist. 7, IV, p. 380.
Maipures, Upper Rio Orinoco, S.-W. Venezuela.

16. ZYGODONTOMYS TAPIRAPOANUS, Allen

1916. Bull. Amer. Mus. Nat. Hist. XXXV, p. 528.
Tapirapoan, Rio Sepotuba, Matto Grosso, Brazil.

17. ZYGODONTOMYS THOMASI, Allen
1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 39.
Campo Alegre, Cumana district, N. Venezuela.

Genus 21. MICROXUS, Thomas

1909. MICROXUS, Thomas, Ann. Mag. Nat. Hist. 8, IV, p. 237.

TYPE SPECIES.—*Oxymycterus mimus*, Thomas.

RANGE.—Colombia, Peru, Ecuador, Rio Grande do Sul, and South Patagonia.

NUMBER OF FORMS.—Five or six.

CHARACTERS.—A small series of skulls examined show that this may be retained for the present as a genus, though it may be that with more material the *Abrothrix* section of *Akodon* would prove to overlap this genus. Very little interorbital constriction present, though this is more marked than in *Lenoxus*; interparietal much reduced or absent; zygomatic plate extremely narrow, scarcely tilted upwards at all typically, and slanting gradually backwards from lower to upper border. Palate, incisive foramina, and bullae as in normal *Akodon*. Upper cheekteeth of *Akodon* type; subsidiary ridges visible in the young specimens. Tail subequal in length to head and body; fur soft; form unmodified, rather small, without special peculiarities. Mammae 1—2=6 in *iheringi*.

The scattered distribution of this genus suggests that it may not be a natural genus, but a series of parallel offshoots from *Akodon*, becoming transitionary towards *Oxymycterus*. The species *torques*, which has been referred to it, is an *Akodon*.

Forms seen: *bogotensis*, *iheringi*, *lanosus*, *mimus*.

LIST OF NAMED FORMS

1. MICROXUS (?) AFFINIS, Allen
1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 89.
San Antonio, Cauca district, W. Colombia.
(Anthony, 1924, suggests that this species belongs to *Akodon*.)

2. MICROXUS BOGOTENSIS, Thomas
1895. Ann. Mag. Nat. Hist. 6, XVI, p. 369.
Bogota region, Central Colombia.

3. MICROXUS IHERINGI, Thomas
1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 308.
Taquara do Mundo Novo, Rio dos Limos, Rio Grande do Sul Province, S. Brazil.

4. MICROXUS LANOSUS, Thomas
1897. Ann. Mag. Nat. Hist. 6, XX, p. 218.
Straits of Magellan, Monteith Bay, S. Patagonia.

5. MICROXUS LATEBRICOLA, Anthony
1924. Amer. Mus. Nov. no. 139, p. 3.
Hacienda San Francisco, Rio Cusutagua, Ambato, Central Ecuador.

6. MICROXUS MIMUS, Thomas

1901. Ann. Mag. Nat. Hist. 7, VII, p. 183.
Limbane, Puno Dept., S.-E. Peru.

Genus 22. LENOXUS, Thomas

1909. Lenoxus, Thomas, Ann. Mag. Nat. Hist. 8, IV, p. 236.

Type Species.—*Oxymycterus apicalis*, Allen.

Range.—South-east Peru.

Number of Forms.—One.

Characters.—Skull with very broad interorbital region, and braincase not much wider than rostrum. Nasals long, extending posteriorly behind the premaxillo-maxillary suture. Interparietal well developed. Zygomatic plate in proportion to skull extremely low and narrow, shaped about as *Microxus*. Incisive foramina broad, extending about to toothrow. Palate broad, extending about to M.3. Bullae small. Toothrow placed far forwards in skull. Dentition evidently of *Akodon* type (two skulls seen only).

Form heavy, rather large, Ratlike; fur soft; ear large; claws not enlarged; tail not well haired, about as long as head and body. The genus is in fact a non-fossorial representative of *Oxymycterus*.

Forms seen: *apicalis*.

List of Named Forms

1. LENOXUS APICALIS, Allen

1900. Bull. Amer. Mus. Nat. Hist. XIII, p. 224.
Inca Mines, Rio Inambari, S.-E. Peru.

Genus 23. OXYMYCTERUS, Waterhouse

1837. Oxymycterus, Waterhouse, Proc. Zool. Soc. London, p. 21.

Type Species.—*Mus nasutus*, Waterhouse.

Range.—Central South America: Eastern Brazil, from Pernambuco south to Uruguay, Northern Argentina; Paraguay; Bolivia, and Peru.

Number of Forms.—Eighteen are named.

Characters.—Skull long and narrow in appearance, with little interorbital constriction; braincase large; rostrum long; nasals produced forwards over incisors, the nasal opening high. The nasals extend posteriorly behind premaxillo-maxillary suture, as in *Lenoxus*. No supraorbital ridges. Zygomatic plate low, about as in *Lenoxus*; rarely very slightly angular; infraorbital foramen well open. Pterygoid fossae long; toothrow far forward in skull. Palate extending about to the last molars; incisive foramina very broad and extending to toothrows. Bullae not enlarged; mandible with relatively low coronoid process.

Upper cheekteeth narrow, originally with relatively high cusps, and clear traces of subsidiary ridges in the main outer folds. M.3 reduced. General dental pattern of *Akodon* type. Lower molars originally very complex; in adult in M.1 and M.2 there are often traces of subsidiary ridges retained in main inner and outer folds; posterointernal heel of M.1 and M.2 well developed; M.1 with six, M.2 with four cusps, as usual; M.3 medium in size, its pattern like that of M.2.

Externally rather large; more or less modified for fossorial life, though much less highly than in *Notiomys* or *Blarinomys*; tail moderately or poorly haired, not reduced in length though rather shorter than head and body; foreclaws always enlarged and prominent; D.5 manus strongly reduced; outer digits of hindfoot much shorter than central three; fur usually not thick; ear medium; snout said to be long and mobile.

Forms seen: *angularis*, *akodontius*, *doris*, *delator*, *hispidus*, *inca*, *iris*, *judex*, *jacentior*, *nasutus*, *paramensis*, *platensis*, *questor*, *roberti*, *rufus*.

List of Named Forms

1. OXYMYCTERUS AKODONTIUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 615.
Higuerilla, Valle Grande Dept. Jujuy Province, Argentina.

2. OXYMYCTERUS ANGULARIS, Thomas

1909. Ann. Mag. Nat. Hist. 8, IV, p. 237.
São Lorenzo, Pernambuco Province, Brazil.

3. OXYMYCTERUS DELATOR, Thomas

1903. Ann. Mag. Nat. Hist. 7, XI, p. 489.
Sapucay, Paraguay.

4. OXYMYCTERUS DORIS, Thomas

1916. Ann. Mag. Nat. Hist. 8, XVIII, p. 478.
Charuplaya, Upper Rio Mamoré, S. Bolivia.

5. OXYMYCTERUS HISPIDUS, Pictet

1843. Mem. Soc. Phys. et d'Hist. Nat. de Genève, X, p. 212.
Bahia, E. Brazil.

6. OXYMYCTERUS INCA, Thomas

1900. Ann. Mag. Nat. Hist. 7, VI, p. 298.
Perené, Junin Province, Central Peru.

7. OXYMYCTERUS IRIS, Thomas

1900. Ann. Mag. Nat. Hist. 7, VII, p. 183.
São Ernesto, Mapiri, Central Bolivia.

8. OXYMYCTERUS JUDEX, Thomas

1909. Ann. Mag. Nat. Hist. 8, IV, p. 238.
Joinville, Santa Catharina, S. Brazil.

9. OXYMYCTERUS JULIACAE, Allen

1900. Bull. Amer. Mus. Nat. Hist. XIII, p. 223.
Inca Mines, Rio Inambari, S.-E. Peru.

10. OXYMYCTERUS MISIONALIS, Sanborn

1931. Proc. Biol. Soc. Washington, XLIV, p. 1.
Caraguatay, Rio Paranay, Misiones Province, N.-E. Argentina.

11. OXYMYCTERUS NASUTUS, Waterhouse

1837. Proc. Zool. Soc. London, p. 16.
Maldonado, Uruguay

12. OXYMYCTERUS PLATENSIS, Thomas

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 244.
Ensenada, La Plata, E. Argentina.

13. OXYMYCTERUS PARAMENSIS PARAMENSIS, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 139.
Choquecamate, Rio Securé, Central Bolivia.

14. OXYMYCTERUS PARAMENSIS JACENTIOR, Thomas

1925. Ann. Mag. Nat. Hist. 9, XV, p. 580.
Carapari, Yacuiba, Cochabamba district, S. Bolivia.

15. OXYMYCTERUS QUAESTOR, Thomas

1903. Ann. Mag. Nat. Hist. 7, XI, p. 226.
Roca Nova, Serra do Mar, E. Parana, S. Brazil.

16. OXYMYCTERUS ROBERTI, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 530.
Paranahyba, Rio Jordão, S.-W. Minas Geraes Province, E. Brazil.

17. OXYMYCTERUS ROSTELLATUS, Wagner

1842. Arch. für Naturgesch, 1, VIII, p. 361.
Bahia, E. Brazil.

18. OXYMYCTERUS RUFUS, Desmarest

1819. Nouv. Dict. d'Hist. Nat. 2d. ed. Art. Rat. esp. 23, 29, p. 62.
Paraguay.
Synonym: *dasytrichos*, Wied, 1826, Beitr. 2. Naturg. v. Brasilien, p. 425.
Bahia, E. Brazil.

Genus 24. BLARINOMYS, Thomas

1896. Blarinomys, Thomas, Ann. Mag. Nat. Hist. 6, XVIII, p. 310.

Type Species.—*Oxymycterus breviceps*, Winge.

Range.—Lagoa Santa, Eastern Brazil.

Number of Forms.—One.

Characters.—Highly modified for subfossorial life; fur crisp, short; eyes extremely reduced; ear hidden in fur; tail short, less than half head and body length, not well haired; hindfoot broad, all digits with prominent though not excessively developed claws; manus with four functional digits, D.5 strongly reduced, claws long but not extremely so. Skull with almost no interorbital constriction, extremely broad between orbits. Interparietal absent; palate extending about to M.3; mesopterygoid region square; bullae moderate. Zygomatic plate extremely narrow for a Murine Rodent, and infraorbital foramen very large indeed, comparatively.

Cheekteeth of the few seen too worn for exact pattern to be noted; evidently relatively simple; M.3 much reduced, ring-shaped.

Forms seen: *breviceps*.

List of Named Forms

1. BLARINOMYS BREVICEPS, Winge

1888. E. Museo Lundii, 1, no. 3, p. 34.
Lagoa Santa, Rio des Velhas, S.-W. Minas Geraes Province, E. Brazil.

Genus 25. NOTIOMYS, Thomas

1890. Notiomys, Thomas, in Milne-Edwards: Mission Sci. du Cap. Horn, 1882–3, vi, Mamm. p. 23.
1903. Chelemys, Thomas, Ann. Mag. Nat. Hist. 7, XII, p. 242. (*Hesperomys megalonyx*, Waterhouse.)
1919. Geoxus, Thomas, Ann. Mag. Nat. Hist. 9, III, p. 209. (*Geoxus fossor*, Thomas.)

Type Species.—*Hesperomys* (*Notiomys*) *edwardsi*, Thomas.

Range.—Argentine (Mendoza), Chile, and Patagonia.

Number of Forms.—Fourteen.

Characters.—Highly modified for fossorial life. In the type species, the fur is very soft, the eye and ear are about as in *Blarinomys*; tail about half head and body length, well haired; hindfoot, claws powerful; foreclaws very long, though less thickened than in other species; pollex very small, but less reduced than is normal, and bearing claw. In the other species (examined) the ear is less reduced; the foreclaws are immense, about as in the Microtine genus *Prometheomys*; D.5 is strongly reduced, but clawed; pollex with claw.

In the type species, skull with minute interparietal, very broad frontals, and shortened rostrum; coronoid process relatively low; in the *valdivianus* group, interorbital constriction is not much marked, the braincase is broad and rounded, the interparietal moderate; the zygomatic plate is about as in *Abrothrix*; the incisive foramina extend between the toothrows. Both these specific groups have cheekteeth derivable probably from an *Akodon* type, with M.3 strongly reduced, particularly in the upper jaw (excessively so in the type species). In the *megalonyx* group, the skull is much more normal, with interorbital constriction marked, the zygomatic plate about straight anteriorly, the interparietal moderate; in these species, the dentition is quite different, the upper cheekteeth of *Akodon* type, but dentition relatively heavy, and evidently pattern preserved longer. The lower teeth are with deep folds, high cusps; and M.$\frac{3}{3}$ not extremely reduced. Finally *N. angustus*, based on a skull the external characters of which are not known, is cranially almost exactly as in the *valdivianus* group, but the molars are much heavier, intermediate in form between *valdivianus* and *megalonyx* groups, with M.3 much less reduced in the lower jaw than in the former. Subsidiary ridges in the main folds are present in *angustus* and the *megalonyx* group, and may sometimes be seen in the species with weaker dentition.

These groups were referred by Thomas to three genera, *Notiomys*, *Geoxus*, and *Chelemys*. Osgood (1925, Field Mus. Nat. Hist. Pub. Zool. ser. XII, p. 117) revised the group, and treated all the species as one genus, *Notiomys*. At first sight the extreme types appear very distinct, but it seems possible to grade through transitionary types from one extreme to the other. In the genus, the bullae are rather small, the zygoma is narrow.

The main types may have their characters noted as follows:

	FORECLAWS	EAR	UPPER TEETH	THIRD LOWER MOLAR	SKULL
N. edwardsii (type of genus)	Less thickened	Hidden in fur	Simplified early in life? M.3 minute	Much reduced	Rostrum short, frontals very broad, coronoid lower
N. valdivianus group (Genus *Geoxus* of Thomas)	Extremely enlarged	Less reduced	Simplified early in life; M.3 strongly reduced	Much reduced	Like a small *Oxymycterus* in upper view; coronoid lower
N. angustus (referred to *Chelemys* by Thomas)	? (not known)	?	Heavier in pattern than the above, lighter than *megalonyx* group	Not much reduced	As in *valdivianus* group
N. megalonyx group (Genus *Chelemys* of Thomas)	Extremely enlarged	Less reduced	Heavy; pattern preserved till old age; M.3 little reduced	Not reduced	Not abnormal; coronoid less low

Members of the latter group are usually larger than the other species.

Forms seen: *araucanus*, *angustus*, *edwardsii*, *fossor*, *fumosus*, *macronyx*, *megalonyx*, *valdivianus*, *vestitus*.

List of Named Forms

edwardsii Group

1. NOTIOMYS EDWARDSII, Thomas

1890. Milne-Edwards, Mission Sci. du Cap. Horn. 1882, 1883, vi, Mamm. p. 24.
South of Santa Cruz, S. Patagonia.

valdivianus Group

2. NOTIOMYS ANGUSTUS, Thomas

1927. Ann. Mag. Nat. Hist. 9, XIX, p. 654.
Bariloche, Lake Nahuel Huapi, Neuquen Territory, N.-W. Patagonia.
(On account of cranial characters this species is provisionally referred to the present group.)

3. NOTIOMYS FOSSOR, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 209.
Maiten, Chubut Territory, N.-W. Patagonia.

4. NOTIOMYS MICHAELSENI, Matschie

1898. Hamburger Magelhaen. Reise. Säugeth. p. 5.
Punta Arenas, Straits of Magellan, S. Chile.
Synonym: *microtis*, Allen, 1903, Bull. Amer. Mus. Nat. Hist. XIX, p. 189. Santa Cruz, S.-W. Patagonia.

5. NOTIOMYS VALDIVIANUS VALDIVIANUS, Philippi

1858. Arch. für Naturgesch. 1, XXIV, p. 303.
Valdivia Province, W. Chile.

6. NOTIOMYS VALDIVIANUS ARAUCANUS, Osgood
1925. Field. Mus. Nat. Hist. Publ. Zool. ser. XII, p. 117.
Tolhuaca, Malleco Province, Central Chile.

7. NOTIOMYS VALDIVIANUS CHILOENSIS, Osgood
1925. Field. Mus. Nat. Hist. Publ. Zool. ser. XII, p. 117.
Quellon, Chiloe Island, W. Chile.

megalonyx Group

8. NOTIOMYS CONNECTENS, Osgood
1925. Field. Mus. Nat. Hist. Publ. Zool. ser. XII, no. 9, p. 120.
Villa Portales, Cautin Province, Chile.

9. NOTIOMYS DELFINI, Cabrera
1905. Rev. Chilena d. Hist. Nat. IX, p. 15.
Punta Arenas, Straits of Magellan, S. Chile.

10. NOTIOMYS MACRONYX, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 362.
Fort San Rafael, Mendoza Province, W. Argentina.

11. NOTIOMYS MEGALONYX, Waterhouse
1844. Proc. Zool. Soc. London, p. 154.
Lake Quintero, Valparaiso Province, W. Chile.
Synonym: *niger*, Philippi, 1872, Zeitschr. gesammt. Naturw. Berlin, Neue Folge, 6, p. 445.
(?) *andinus*, Philippi, 1858, Arch. für Naturg. xxiv, 1, p. 77.

12. NOTIOMYS VESTITUS VESTITUS, Thomas
1903. Ann. Mag. Nat. Hist. 7, XII, p. 242.
Valle del Lago Blanco, S. Chubut Territory, Patagonia.

13. NOTIOMYS VESTITUS ALLENI, Osgood
1925. Field. Mus. Nat. Hist. Publ. Zool. ser. XII, 9, p. 124.
Upper Rio Chico, Santa Cruz Territory, S.-W. Patagonia.

14. NOTIOMYS VESTITUS FUMOSUS, Thomas
1927. Ann. Mag. Nat. Hist. 9, XIX, p. 654.
Sierra de Pilpil, Neuquen Territory, N.-W. Patagonia.

Genus 26. SCAPTEROMYS, Waterhouse

1837. SCAPTEROMYS, Waterhouse, Proc. Zool. Soc. London, p. 20.

TYPE SPECIES.—*Mus tumidus*, Waterhouse.

RANGE.—South America: Uruguay, Northern Argentina, and Matto Grosso.

NUMBER OF FORMS.—Five.

CHARACTERS.—Skull with comparatively little interorbital constriction, and no or scarcely developing ridges. Interparietal moderate. Zygomatic plate low, slightly concave, very sharply cut back above. Incisive foramina reaching toothrows. Palate extending back behind molars, but without lateral pits. There are apparently two very well-marked specific groups, one containing the type, and the other containing the much larger *S. gnambiquarae*, in which the parietals are weakly ridged (though not the frontals), the occipital region is higher than in the type, and slants forwards, and the zygoma is heavier, with a relatively long jugal.

Upper cheekteeth: M.1 with two inner, two outer curved folds, the inner folds shorter and weaker than the opposite ones; the second inner fold of M.1 with a small but clearly traceable subsidiary ridge, as found in *Oryzomys* and allies; this retained more or less through life. M.2 like M.1, but the portion in front of the inner fold compressed, and the front inner fold absent. M.3 reduced, with usually traces of two folds only. The folds nearly meet across the tooth, and are not heavy; with wear the main outer folds isolate as broad enamel islands, in a manner reminiscent of the teeth of *Spalax*. The inner folds appear to persist through life. The cusps are quite well marked, but with wear the molars tend soon to become more or less flat.

The lower teeth are like the upper series, except that it is the inner folds which isolate, and the outer which persist. M.1 with traces of three inner folds (the front one small), and two original outer folds, the front one of which may wear out; M.2 with two inner and one outer folds (or sometimes one inner one only); M.3 with a fold each side, and originally with a small posterointernal fold, which is soon lost.

The whole pattern suggests a specialized and simplified form of dentition derivable from a complex pattern perhaps like that of *Nectomys*, or perhaps of *Akodon*. Compared with *Scotinomys*, another genus which has similar isolation of outer folds in upper molars in adult, the folds here extend across the tooth, and are not placed centrally nor do they run longitudinally down the centre of the tooth.

Mammae 2—2=8. Form thickset, heavy; tail well haired below, hair usually forming a swimming-fringe, but scales visible in the upper portion; feet long; the three centre digits of the hindfoot elongated, the outer digits relatively short, though all the digits bear large claws. Foreclaws prominent and long. Ear relatively small. This mixture of slightly fossorial and slightly aquatic characters parallels the Palaearctic Microtine genus *Arvicola*.

Although the genus is tentatively placed in the neighbourhood of the *Akodon* section, it is very distinct, and its relationships are not clear.

Members of the *gnambiquarae* group are over 200 mm. head and body, or thereabouts; the type group is roughly 170 mm. or less.

Forms seen: *aquaticus*, *gnambiquarae*, *tumidus*.

List of Named Forms

tumidus Group

1. SCAPTEROMYS AQUATICUS, Thomas

1920. Ann. Mag. Nat. Hist. 9, V, p. 477.
Isla Ella, Parana Delta, Buenos Aires Province, E. Argentina.

2. SCAPTEROMYS TOMENTOSUS, Lichtenstein

1829. Darstellung Neuer Säugeth. VII, p. xxxiii, fig. 1.
Maldonado, Uruguay.

3. SCAPTEROMYS TUMIDUS, Waterhouse

1837. Proc. Zool. Soc. London, p. 15.
Maldonado, Uruguay.

gnambiquarae Group

4. SCAPTEROMYS CHACOËNSIS, Gyldenstolpe

1932. Arkiv. för Zool. Bd. 24B, no. 1, p. 1.
Rio de Oro, Chaco Austral, N. Argentina.

5. SCAPTEROMYS GNAMBIQUARAE, Ribeiro

1914. Comm. Linhas. Telegr. de Matto Grosso, Rio de Janeiro, Annex no. 5, p. 37.
Ultimo Acampamento, Chapada, Matto Grosso Province, S. Brazil.

Genus 27. SCOTINOMYS, Thomas

1913. SCOTINOMYS, Thomas, Ann. Mag. Nat. Hist. 8, XI, p. 408.

TYPE SPECIES.—*Hesperomys teguina*, Alston.

RANGE.—Central America: Mexico, Guatemala, Honduras, Costa Rica, Panama.

NUMBER OF FORMS.—Six.

CHARACTERS.—Skull (six seen only) with very faint supraorbital ridges; zygomatic plate straight anteriorly; interparietal well developed; palate reaching about to level of hinder part of toothrows.

Cheekteeth hypsodont, entirely different in pattern from *Akodon*, or for that matter from any other genus seen. Upper molars abnormally narrowed, each outer fold curving backwards and in adult isolating completely as a long centrally placed longitudinal island, something after the manner of *Cricetus*, but very different in appearance from that genus; the folds not persistent, and weak, the cusps not prominent. M.1 divided anteriorly. The inner folds weak, not isolating. Lower cheekteeth: M.3 nearly as large as M.2; the inner folds curving strongly forwards and more or less isolated as islands. Two both in M.1 and M.2; one main outer fold in these teeth; M.3 with one anterior inner and one posterior outer fold. Three inner roots in M.1, two in M.2, and two in M.3 (Thomas). (In *Akodon* and *Zygodontomys*, there are two in M.1, one in each of the other teeth (Thomas).)

The isolated folds in the upper molars usually number two in M.1, two in M.2, one in M.3. The youngest specimen examined suggests that the subsidiary ridges are not entirely suppressed in the main outer folds. It would interest me greatly to examine more and younger specimens of this genus, to see how far this rather extraordinary pattern is a constant character through life. At the moment the relationships of the genus are not at all clear.

Tail shorter than head and body (about 70 per cent in those seen). Size small, head and body length under 100 mm., in those seen. Ear relatively small. Digits normal, foot narrow. Tail not well haired.

Forms seen: *teguina*, *xerampelinus*.

List of Named Forms

1. SCOTINOMYS TEGUINA TEGUINA, Alston

1876. Proc. Zool. Soc. London, p. 755.
Coban, Guatemala.

2. SCOTINOMYS TEGUINA APRICUS, Bangs

1902. Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 40.
Boquete, Chiriqui, Panama.

3. SCOTINOMYS TEGUINA RUFONIGER, Sanborn

1935. Field Mus. Nat. Hist. Publ. Zool. ser. XX, no. 11, p. 84.
Mountains west of San Pedro, N.-W. Honduras.

4. SCOTINOMYS TEGUINA SUBNUBILUS, Goldman

1935. Proc. Biol. Soc. Washington, XLVIII, p. 141.
Ocuilapa, 10 miles north-west of Ocozucantla, about 25 miles west of Tuxtla, Gutierrez, Chiapas, Mexico.

5. SCOTINOMYS IRAZU, Allen

1904. Bull. Amer. Mus. Nat. Hist. XX, p. 46.
Volcan de Irazu, Costa Rica.

6. SCOTINOMYS XERAMPELINUS, Bangs

1902. Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 41.
Volcan de Chiriqui, Chiriqui, Panama.

The True Hamsters

Cricetus Section

Ten generic or subgeneric names have been given to Palaearctic Hamsters in the last few years. The group has been revised by Argyropulo (1933, Zeitschr. für Säugetierk. Bd. 8, Heft 3, p. 133). This author recognizes three genera only (not counting *Calomyscus*). The present classification is based chiefly on his arrangement, but four genera are retained.

I am inclined to agree with Miller (Cat. Mamm. West. Europe, 1912), that *Mesocricetus* is a well characterized and very distinct genus. The structure of the infraorbital foramen alone is in my view fully sufficient to support this theory, though there is a little-known form of *Cricetulus* (which I have not seen) which has a similar infraorbital foramen, as figured by Argyropulo. This suggests that this species, *C. kozlovi*, may have to have a generic name when it is better known, and more specimens are taken.

I must note that Argyropulo uses two characters, bullae and cheekteeth pattern, to differentiate between *Cricetulus* and *Phodopus*, but that both break down in the series represented in London. I am unable to distinguish between the bullae of *Phodopus* and *Cricetulus lama* and *alticola*; and the cheekteeth of *P. songorus*, notably a specimen recently received from Russia on the identification of which there can be no doubt, are essentially as in *Cricetulus*.

Genus 28. CRICETULUS, Milne-Edwards

1867. Cricetulus, Milne-Edwards, Ann. Sci. Nat. VII, p. 375.

1933. Allocricetulus, Argyropulo, Zeitschr. für Säugetierk. Bd. 8, Heft 3, p. 133. (*Cricetus eversmanni*, Brandt.) Valid as a subgenus.

1914. TSCHERSKIA, Ognev, Moskva. Dnev. Zool. otd. obsc. liub. jest. 2, p. 102. (*Tscherskia albipes*, Ognev = *Cricetulus triton nestor*, Thomas.) Valid as a subgenus.

1928. CANSUMYS, G. M. Allen, Journ. Mamm. 9, p. 244. (*Cansumys canus*, G. M. Allen.) Not seen. (= *Tscherskia*, *fide* Argyropulo.)

1929. ASIOCRICETUS, Kishida, Lansania, Tokyo, 1, p. 148. (*Asiocricetus bampensis*, Kishida.) Not seen. (= *Tscherskia* ?)

1902. UROCRICETUS, Satunin, Ann. Mus. St. Petersb. VII, p. 574. (*Urocricetus kamensis*, Satunin.) (*Urocricetus* is a synonym of *Cricetulus* s.s.)

TYPE SPECIES.—*Cricetulus griseus*, Milne-Edwards.

RANGE.—South Europe, and Palaearctic Asia. Greece. Asia Minor. Southern European Russia (Kiev, Harkov, Tula, Riazan, Stalingrad, Crimea, Rostov-on-Don, Caucasus and Transcaucasia (*C. migratorius*); Volsk, Volgo-Ural steppe (*C. eversmanni*) (Vinogradov)), Southern Siberia (Kazakstan, Turkmenia, etc.), also Minussinsk, Barnaul, Prealtai steppes, Baikal, Transbaikalia, Amur, Ussuri (Vinogradov); also Pamir; Semirechyia; China, from Tibet, Chinese Turkestan, Shansi, Shensi, Kansu, Mongolia, Manchuria, Korea, Shantung, Honan, Chihli. North Kashmir. Persia. Syria.

NUMBER OF FORMS.—About forty-four.

CHARACTERS.—Skull with moderate interorbital constriction, the braincase not narrowed, the general cranial effect Murine, not highly specialized, the supraorbital ridges, in the typical subgenus, not or scarcely developed. Interparietal broad, not reduced (*Cricetulus* s.s.). Infraorbital foramen like *Cricetus*; zygomatic plate straight anteriorly. (As already noted, one rare form, *kozlovi*, referred to this genus, has an infraorbital foramen which appears to be like that of *Mesocricetus*.) Palate extending slightly behind level of last molars. Incisive foramina broad, well open, often approaching toothrows. Bullae relatively small, or moderate, not flattened except apparently in *lama* and *alticola*, in which they are like those of *Phodopus*. Incisors moderate. Mandible of *Cricetus* type, but coronoid not so extremely developed. Cheekteeth about as in *Cricetus* (below), the proportions normal, i.e. M.3 not reduced, nor tending in the lower series to become the dominant tooth. The pits separating the cusps well developed, sometimes very wide. The pattern appears to be retained longer than in *Cricetus*.

Mammae 8 (Argyropulo). Cheekpouches present. Fur thick and soft; size small in the typical subgenus; tail short or medium, relatively well haired, but evidently as a rule not so shortened as in other Palaearctic genera. Digits not reduced; feet shortened (often the ear is as long as the hindfoot); toes relatively short. Soles may be partly hairy, but never comparing with the abnormal condition of *Phodopus*. A black middorsal stripe present in the *barabensis* group.

ALLOCRICETULUS, proposed as a subgenus for *eversmanni*, is like *Cricetulus*, but interparietal much reduced in adult, and coronoid more powerful and *Cricetus*-like. The male genital organs are said to differ from *Cricetulus* s.s. The animal is larger than the species referred to *Cricetulus*, and with a very strongly reduced tail (a fifth to a sixth head and body length). Head and body more than 110 mm.

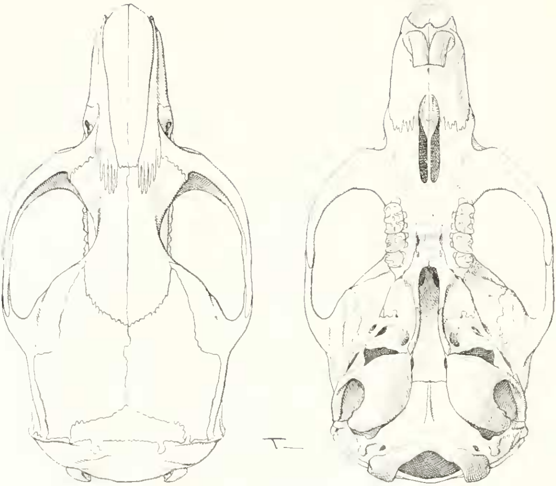

FIG. 20. CRICETULUS MIGRATORIUS, Pallas.
B.M. No. 20.2.9.37, ♂; × 3½.

FIG. 21. CRICETULUS MIGRATORIUS, Pallas.
B.M. No. 20.2.9.37, ♂; × 3½.

TSCHERSKIA is considered as a subgenus of *Cricetulus* by Argyropulo, based on the *triton* group. These appear to be very different animals from the above. Quite strong frontal ridges are developed, and the parietals are weakly ridged. The interparietal is not reduced. The pterygoid fossae are deep (shallower in other subgenera). Bullae are enlarged and well inflated. Mandible about as *Cricetus*.

The size is large (for the genus), 120–160 mm. or perhaps more. The tail is long (up to 56 per cent of head and body length).

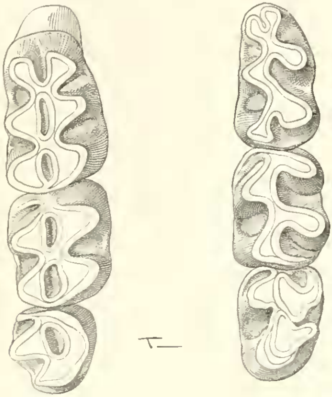

FIG. 22. CRICETULUS MIGRATORIUS, Pallas.
Cheekteeth: B.M. No. 20.2.9.37, ♂; × 20.

Apart from these subgenera, I recognize four groups in *Cricetulus* s.s. in B.M. material.

The *lama* group, in which the bullae are small, flattened, and shaped about as in *Phodopus*. Head and body up to about 103 mm. Kashmir, and Tibet. Contains the species *lama* and *alticola*. Argyropulo ranks *alticola* as a subspecies of *lama*, but Mr. Chaworth-Musters has drawn my attention to the fact that they are apparently separate species. *C. lama* has a long tail, about 44 per cent of head and body length, whereas in *alticola* it is only 33 per cent of this measurement. The former appears little known.

In the remainder, so far as seen, the bullae are larger and not abnormal.

The *barabensis* group. With a black middorsal stripe. Head and body about 82–109. Tail short, roughly 30 per cent of head and body. *C. barabensis* and its races range in Shantung, Shensi, Mongolia, Chihli, Manchuria, Ussuri, Amur, Transbaikalia, and westwards to Barnaul district.

The *longicaudatus* group. No middorsal stripe. A relatively long tail (in the British Museum series, chiefly *andersoni*, averages about 49 per cent of head and body length.) Includes, I suppose, the species *kamensis* of Satunin (not seen), and forms referred as races to *longicaudatus* by Argyropulo. Siberia (Minussinsk district), and in Tibet, Mongolia, Kansu, Shansi, Shensi, and Chihli. Size roughly as in *barabensis* group.

The *migratorius* group. Like the last, but with a shorter tail. *C. migratorius* and its races range from Greece, Southern Russia, and Asia Minor, Persia, Syria, a large part of Russian Turkestan, Pamir, and eastwards to Chinese Turkestan. Size up to 135 mm. head and body, but usually less. Tail on average about 30 per cent of head and body.

The range of the subgenus *Allocricetulus* is "Volgo-Ural steppe northwards to towns Volsk, Buguruslan and Orenberg; Kazakstan eastwards to Lake Saissan" (Vinogradov), and Mongolia.

The range of the subgenus *Tscherkia* is Southern Ussuri, and Eastern China (Korea, Shantung, Honan, Chihli, Shensi, Kansu).

Forms seen: *alticola*, *andersoni*, *arenarius*, *atticus*, *barabensis*, *beljawi*, *cinereus*, *eversmanni*, *fulvus*, *fumatus*, *griseiventris*, *griseus*, *incanus*, *lama*, *microdon*, *migratorius*, *nestor*, *obscurus*, *phaeus*, *tibetanus*, *triton*, *vernula*.

List of Named Forms

Subgenus *Cricetulus*, Milne-Edwards

barabensis Group

1. CRICETULUS BARABENSIS BARABENSIS, Pallas

1770. Pallas Reise. vol. ii, p. 704.
Banks of River Ob, Siberia.
Synonym: *furunculus*, Pallas, 1778, Nov. Sp. Quad. Glir. Ord. p. 273.

2. CRICETULUS BARABENSIS GRISEUS, Milne-Edwards

1867. Ann. Sci. Nat. VII, p. 376.
Suen-hoa-fu, near Kalgan, Mongolia.
Synonym: (?) *manchuricus*, Mori, 1930, Annot. Zool. Jap. 12, p. 419. Harbin, Manchuria.

3. CRICETULUS BARABENSIS OBSCURUS, Milne-Edwards

1867. Rech. Mamm. p. 136.
Sartchy, Hwang-ho, Inner Mongolia.

4. CRICETULUS BARABENSIS FUMATUS, Thomas

1909. Ann. Mag. Nat. Hist. 8, IV, p. 503.
Chu Chia Tai, near Chang Chun, Kirin province, Manchuria.

longicaudatus Group

5. CRICETULUS LONGICAUDATUS LONGICAUDATUS, Milne-Edwards

1867. Rech. Mamm. p. 136.
Sartchy, Mongolia.

6. CRICETULUS LONGICAUDATUS GRISEIVENTRIS, Satunin

1903. Ann. Mus. St. Petersb. VII, p. 566.
River Bis-shen-gol, south side of Altain-nuru, Gobi-Altai.

7. CRICETULUS LONGICAUDATUS DICHROOTIS, Satunin

1903. Ann. Mus. St. Petersb. VII, p. 567.
River Gorban-angyr-gol, Nanshan, Central Asia.

8. CRICETULUS LONGICAUDATUS ANDERSONI, Thomas

1908. Proc. Zool. Soc. London, p. 642.
100 miles north-west of Tai-Yuen-Fu, Shansi, N. China.

9. CRICETULUS LONGICAUDATUS NIGRESCENS, G. M. Allen

1925. Amer. Mus. Nov. no. 179, p. 2.
Province of Chihli, 100 miles north-east of Peking, China.

10. CRICETULUS LONGICAUDATUS KOZHANTSCIKOVI, Vinogradov

1927. Small Mammals from the Minussinsk district and Urjankhai, pp. 33–50, p. 36.
Tukeek-kem River, Ussink Frontier district, Sayan Mountains.

11. CRICETULUS KAMENSIS, Satunin

1903. Ann. Mus. St. Petersb. VII, p. 574.
River Mok-tschjun, district of Mekong, N.-E. Tibet.

lama Group

12. CRICETULUS LAMA, Bonhote

1905. Abstr. Proc. Zool. Soc. London, no. 22, p. 14; Proc. Zool. Soc. London, p. 305.
Lhasa, Tibet.

13. CRICETULUS ALTICOLA ALTICOLA, Thomas

1917. Ann. Mag. Nat. Hist. 8, XIX, p. 455.
Shushul, Ladak.

14. CRICETULUS ALTICOLA TIBETANUS, Thomas & Hinton

1922. Ann. Mag. Nat. Hist. 9, IX, p. 180.
Tingri, Tibet.

migratorius Group

15. CRICETULUS MIGRATORIUS MIGRATORIUS, Pallas

1773. Reise, ii, p. 703.
Lauf des Ural-Flusses.
Synonym: *accedula*, Pallas, 1778, Nov. Sp. Quad. Glires, p. 257. Russia.

16. CRICETULUS MIGRATORIUS ARENARIUS, Pallas

1773. Reise, ii, p. 704.
Irten, Siberia.

17. CRICETULUS MIGRATORIUS PHAEUS, Pallas

1778. Nov. Sp. Quad. Glir. Ord. p. 261.
Transcaspian region, U.S.S.R.
Synonym: *migratorius phaeus sviridenkoi*, Pidoplitschka, 1928, Trav. Mus. Kiev, 5, p. 428.
murinus, Severtzow, 1876, Ann. Nat. Hist. p. 54. Turkestan.

18. CRICETULUS MIGRATORIUS CINERASCENS, Wagner

1848. Wiegmann's Arch. für Naturgesch. 1, p. 184.
Syria.

19. CRICETULUS MIGRATORIUS ISABELLINUS, de Filippi

1865. Viaggio in Persia, p. 344.
Persia.

20. CRICETULUS MIGRATORIUS FULVUS, Blanford

1875. Journ. Asiat. Soc. Bengal, XLIV, p. 108.
Plains of E. Turkestan, Pamir, and Wakhan.

21. CRICETULUS MIGRATORIUS COERULESCENS, Severtzow

1879. Est. Antrop. l. Etnogr. 1, lief 1, p. 63.
Zapiski, Turkestan.
Synonym: *pamirensis*, Ognev, 1923, Bull. Soc. Nat. Moscow, 31, p. 89. Russian Pamir.
migratorius coerulescens ognevi, Argyropulo, 1933, Zeitschr. für Säugetierk. Bd. 8, Heft 3, p. 148.

22. CRICETULUS MIGRATORIUS ATTICUS, Nehring

1902. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 3.
Pentelikon, Attica, Greece.

23. CRICETULUS MIGRATORIUS NEGLECTUS, Ognev

1916. Bull. Soc. Nat. Amis. Nat. Crimée, 5, p. 81.
Two specimens examined, one from River Burulcha, tributary of River Salgir, and one from near village Atamanaia, Melitopol sub-district of Tavricheskaia Govt., S. Russia.
Synonym: *falzfeini*, Matschie, 1918, Sitz. Ber. Ges. Nat. Fr. Berlin, p. 1. Ascania Nova, Taurien, Südrussland.

24. CRICETULUS MIGRATORIUS BELLICOSUS, Scharleman

1916. Bull. Vredit, Selisk, Choz. 3, no. 1, p. 6.
Gouv. Kiev, S. Russia.

25. CRICETULUS MIGRATORIUS VERNULA, Thomas

1917. Ann. Mag. Nat. Hist. 8, XIX, p. 453.
Khotz, near Trebizond, Asia Minor.

26. CRICETULUS MIGRATORIUS CAESIUS, Kashkarov

1923. Proc. Turkestan Sci. Soc. 1, p. 215.
Kara-tau Mountains, valley of River Ters, Turkestan.

27. CRICETULUS MIGRATORIUS PULCHER, Ognev

1924. Rodentia of N. Caucasus, Rostov-on-Don, p. 22.
Near Lars, Military Georgian Road, 27 kilometres from town of Vladikawkas, Caucasus.

28. CRICETULUS MIGRATORIUS CINEREUS, Kashkarov

1926. Trans. Sci. Soc. Turkestan, 1, p. 215.
Tashkent, Turkestan.

29. CRICETULUS MIGRATORIUS ZVIERESOMBI, Pidoplitschka

1928. Trav. Mus. Kiev, 5, p. 421.
Rostov-on-Don, S. Russia.

Not allocated to Group

30. CRICETULUS FUSCATUS, Brandt

1835. Mém. Acad. St. Petersb. 1, p. 435.
Locality not known.

31. CRICETULUS (?) KOZLOVI, Satunin

1902. Ann. Mus. Zool. St. Petersb. 7, p. 570.
Oasis Sa-tschou, Kukunor, Tibet.
(For note on the cranial characters of this species see above.)

Subgenus *Allocricetulus*, Argyropulo

32. CRICETULUS EVERSMANNI EVERSMANNI, Brandt

1859. Mel. Biol. Acad. St. Petersb. p. 210.
E. Russia.

33. CRICETULUS EVERSMANNI BELJAWI, Argyropulo

1933. Zeitschr. für Säugetierk. 8, p. 137.
Saissan, Russian Asia.

34. CRICETULUS EVERSMANNI MICRODON, Ognev

1927. Bull. Soc. Nat. Moscou, 33, p. 14.
District of the Bougourouslan, Gouv. Samara, S.-E. Russia.

35. CRICETULUS CURTATUS, G. M. Allen

1925. Amer. Mus. Nov. no. 179, p. 3.
Iren Dabasu, Mongolia.

Subgenus *Tscherskia*, Ognev

36. CRICETULUS TRITON TRITON, de Winton

1899. Proc. Zool. Soc. London, p. 575.
N. Shantung, China.

37. CRICETULUS TRITON BAMPENSIS, Kishida

1929. Lansania, Tokyo, 1, p. 150.
Korea.

38. CRICETULUS TRITON YAMASHINAI, Kishida

1929. Lansania, Tokyo, 1, p. 156.
Korea.

39. CRICETULUS TRITON INCANUS, Thomas

1908. Abstr. Proc. Zool. Soc. London, p. 45; Proc. Zool. Soc. London, p. 973.
Near Ko-lan-chow, Shansi, China.

40. CRICETULUS TRITON NESTOR, Thomas

1907. Proc. Zool. Soc. London, p. 466.
Kim-hoa, 65 miles north-east of Seoul, Korea.
Synonym: *albipes*, Ognev, 1914, Moskva. Dnev. Zool. otd. obsc. liub, jest. 2, p. 105. S. Ussuri, Siberia.

41. CRICETULUS TRITON FUSCIPES, G. M. Allen

1925. Amer. Mus. Nov. no. 179, p. 5.
Peking, Chihli, China.

42. CRICETULUS TRITON COLLINUS, G. M. Allen

1925. Amer. Mus. Nov. no. 179, p. 5.
Base of Tai-pei-shan, Tsingling Mountains, Shensi, China.

43. CRICETULUS TRITON CANUS, G. M. Allen

1928. Journ. Mamm. Baltimore, 9, p. 244.
Choni, S. Kansu, China.

44. CRICETULUS TRITON MEIHSIENENSIS, Ho

1935. Contr. Biol. Lab. Sci, Soc. China, 10, p. 288.
Meh-hsien, Shensi, China.

Genus 29. PHODOPUS, Miller

1910. PHODOPUS, Miller, Smiths. Misc. Coll. LII, p. 498.
1917. CRICETISCUS, Thomas, Ann. Mag. Nat. Hist. 8, XIX, p. 456. *Cricetulus campbelli*, Thomas.

TYPE SPECIES.—*Cricetulus bedfordiae*, Thomas.

RANGE.—Siberia and China. "The Barabinsk, Kulundinsk and Prealtai Steppes, Southern Altai, Eastern Kazakstan, westwards to River Ischim, and Lake Balkash, the Minusinsk and Transbaikal districts" (Vinogradov), and Mongolia (*songorus* group); Mongolia, Shensi, Manchuria(?), and Tibet (*roborovskii* group).

NUMBER OF FORMS.—Six.

CHARACTERS.—"Feet unusually short and broad, densely hairy throughout, the tubercles of both palm and sole confluent into a single blister-like mass. Skeleton of feet shortened but proportionate lengths of bones not specially modified" (Miller). Skull without much constriction in interorbital region; supraorbital ridges not marked; braincase not narrowed; interparietal less reduced than in *Cricetus*, and rostrum less heavy. Bullae more or less flattened, their inner anterior portion slightly tube-shaped, and projecting forwards to the hamulars. Pterygoid fossae shallow. Palatal foramina broad, not extending to the toothrow as a rule. Zygomatic plate narrow; infraorbital foramen more as in *Cricetus* than *Mesocricetus*. Upper cheekteeth; pattern much as in *Cricetus*; dentition stronger in the *songorus* group, much weaker in those seen of the *roborovskii* (*bedfordiae*) group, in which, at any rate with wear, M.3 becomes more reduced than in any other Palaearctic Hamster examined, the pits separating the cusps are not well marked, and the cusps are more opposite to each other than in the *songorus* group. Mandible like *Cricetus* in *songorus* group, weaker in *roborovskii* group. There appears a certain difference in dentition in these two groups, on account of which Thomas erected a genus *Cricetiscus* for *songorus* and allies. This is not retained by Argyropulo, and bearing in mind slight dental differences which may occur elsewhere, also that the feet of both seem essentially similar, it appears not necessary to do so.

Mammae 8 (Argyropulo). Cheekpouches present. Size small (99 or less head and body length in specimens examined); form very thickset; tail strongly reduced; feet as described above. Foreclaws may be prominent. The tail is less than a fifth of head and body length in those seen.

Two well-marked groups may be recognized:

songorus group: dentition heavier, M.3 less reduced, a black middorsal stripe, and relatively larger. (Most Siberian forms turn white in winter.)

roborovskii group: dentition lighter, M.3 more reduced, no middorsal stripe, and relatively smaller.

Forms seen: *bedfordiae*, *campbelli*, *songorus*.

List of Named Forms

roborovskii Group

1. PHODOPUS ROBOROVSKII ROBOROVSKII, Satunin

1903. Ann. Mus. St. Petersh. VII, p. 571.
Upper part of River Scharogol-dschin, Nanshan, Sinkiang.

2. PHODOPUS ROBOROVSKII BEDFORDIAE, Thomas

1908. Abstr. Proc. Zool. Soc. London, p. 45; Proc. Zool. Soc. London, p. 974.
Yu-lin-fu, Shensi, N. China.

3. PHODOPUS PRAEDILECTUS, Mori

1931. Annot. Zool. Jap. 12, 1930, p. 418.
Cheng-chia-tun, Central Manchuria.
(Not seen; position provisional.)

songorus Group

4. PHODOPUS SONGORUS SONGORUS, Pallas

1773. Reise, ii, p. 703.
Gratschefskoi, 100 kilometres west of Semipalatinsk, Siberia.

5. PHODOPUS SONGORUS CAMPBELLI, Thomas

1905. Ann. Mag. Nat. Hist. VI, p. 322.
Shaborte, N.-E. Mongolia.

6. PHODOPUS SONGORUS CREPIDATUS, Hollister

1912. Smiths. Misc. Coll. LX, no. 14, p. 3.
Chuisaya Steppe, 8 miles south of Kosh-Agatch, Altai, Siberia.

Genus 30. CRICETUS, Leske

1779. Cricetus, Leske, Anfangsgr. Naturg. 1, p. 168.
1799. Hamster, Lacepède, Tabl. des Div. et Ordres & Genres, Mamm. p. 10. (*Hamster nigricans*, Lacepède = *Mus cricetus*, Linnaeus.)
1873. Heliomys, Gray, Ann. Mag. Nat. Hist. 4, XII, p. 417. (*Heliomys jeudii*, Gray = *Mus cricetus*, Linnaeus.)

Type Species.—*Mus cricetus*, Linnaeus.

Range.—Europe; Germany, Belgium, North France, Hungary, Roumania, Yugoslavia (specimens in B.M.), etc. (?); European part of U.S.S.R. northwards approximately to latitude 60°, southwards to Crimea, foothills of main ridge of Caucasus; and eastwards over Kazakstan to Semirechyia district, and Western Siberia to Krasnoiarsk and Minussinsk (Vinogradov). Asia Minor (Miller). Iraq?

Number of Forms.—Ten.

Characters.—Skull highly specialized; rostrum broadened, supraorbital ridges very prominent, and extending backwards over the parietals to the lambdoid crest, sometimes converging and tending to fuse on the parietals; braincase much narrowed; interparietal very small. Frontals abnormally constricted, and zygomata widely spreading. Occipital region of skull upstanding and prominent, sloping forwards. Jugal very short. Zygomatic plate broad, scarcely cut back above. Infraorbital foramen wider above than below, its outer side bearing well-marked plate, and ridged. Palate continuing backwards slightly behind toothrows. Bullae relatively large, well inflated. Palatal foramina large, but usually not reaching M.1. Incisors broad. Mandible with high recurved coronoid process, and narrow angular process which is produced somewhat backwards and separated from the condyle by a deep

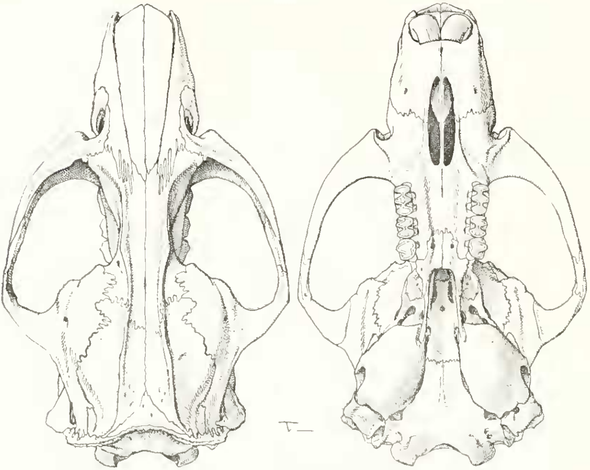

FIG. 23. CRICETUS CRICETUS CRICETUS, Linnaeus.
B.M. No. 8.11.2.38, ♂; × 2.

curved space. M.2 little smaller than M.1, and M.3 very little reduced. M.1 with three laminae, each bearing a pair of cusps, each lamina separated by a deep well open outer and inner fold, the folds approximately equal-sized; a narrow median ridge runs down the centre of the tooth, and separates these folds from each other; between each pair of cusps is a deep pit, isolating early with wear, originally caused by backward prolongation of the outer fold. The cusps are approximately equal in size. M.2 is like M.1, but with only four cusps, although four folds are traceable (as in M.1); the anterointernal fold is reduced. M.3 like M.2, but the posterior pair of cusps rather reduced. Toothrows slightly divergent anteriorly. M.1 four- or five-rooted (Miller). In age the pattern becomes obliterated. Lower teeth much like the upper series, but M.1 very narrow, particularly anteriorly, and the teeth with a well-marked posterointernal heel; the cusps are more slanting and alternating than in the upper series, the inner ones placed anteriorly.

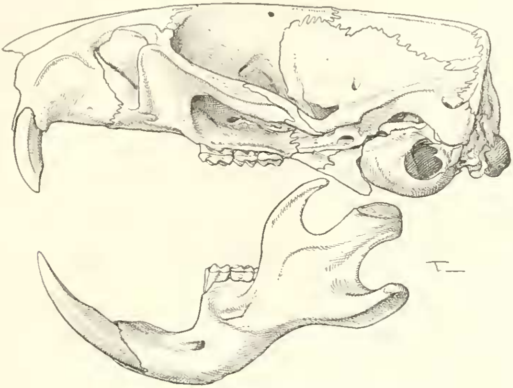

FIG. 24. CRICETUS CRICETUS CRICETUS, Linnaeus.
B.M. No. 8.11.2.38, ♂; × 2.

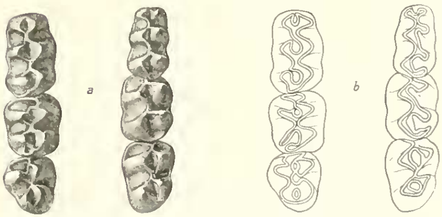

FIG. 25. CRICETUS CRICETUS, Linnaeus.
Cheekteeth: *a*, unworn; *b*, slightly worn; × 5.

Cheekpouches present. Mammae 8. According to Tullberg, the stomach is complex. Size largest of group; normally over 200 mm. head and body length; up to 278 or perhaps more; fur very thick; a specialized colour pattern present (usually light brown above, mostly black below, sides white); tail rudimentary. Hindfeet broad, the soles evidently haired posteriorly, but pads normal; digits not reduced. Forefoot broad; claws usually thick and prominent.

Forms seen: *canescens*, *cricetus*, *latycranius*, "*jeudii*," "*frumentarius*," *stavropolicus*.

List of Named Forms

1. CRICETUS CRICETUS CRICETUS, Linnaeus

1758. Syst. Nat. 1, ed. 10, p. 60.
Germany.
Synonym: *frumentarius*, Pallas, 1811, Zoogr. Rosso-Asiat. 1, p. 161. Russia.
vulgaris, Geoffroy, 1803, Cat. Mamm. Mus. Nat. Hist. p. 196. N. Europe.
nigricans, Lacepède, 1799, Tabl. Div. ordres & genres, Mamm. p. 10. Germany.
niger, Fitzinger, 1867, Sitz. Ber. k. Akad. Wiss. Wien. Math. Nat. Cl. LVI, 1, p. 98
germanicus, Kerr, 1792, Anim. Kingd. p. 243.
fulvus, Bechstein, 1801, Gemeinn. Naturgesch. Deutschlands, 1, 2, p. 1010.
varius, Fitzinger, 1867, Sitz. Ber. k. Akad. Wiss. Wien. Math. Nat. Cl. LVI, 1, p. 98.
albus, Fitzinger, 1867, same reference.
jeudii, Gray, Ann. Mag. Nat. Hist. 4, XII, p. 417, 1873.

2. CRICETUS CRICETUS CANESCENS, Nehring

1899. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 1.
Near Fexhe-Slins, Belgium (banks of the Maas).

3. CRICETUS CRICETUS NEHRINGI, Matschie

1901. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 232.
Slobosia, Roumania.

4. CRICETUS CRICETUS RUFESCENS, Nehring

1899. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 2.
Tjubuk, Ural region.

5. CRICETUS CRICETUS STAVROPOLICUS, Satunin

1907. Tiflis Mitt. Kaukas. Mus. 3, p. 26.
Village Predteca, Steppe on Kalaus River, Govt. Stavropol, Russia.

6. CRICETUS CRICETUS LATYCRANIUS, Ognev

1923. Biol. Isvestia, 1, p. 110.
Village Cheremushka, in the former Nikolaersk subdistrict of Saratov Gouv. Russia.

7. CRICETUS CRICETUS TOMENSIS, Ognev

1924. Rodents of North Caucasus, p. 19.
Rostov-on-Don, S. Russia.

8. CRICETUS CRICETUS FUSCIDORSIS, Argyropulo

1932. Trav. Inst. Zool. Acad. Sci. Leningrad, 1, p. 235.
Semiretschyia, U.S.S.R.

9. CRICETUS CRICETUS POLYCHROMA, Krulikovskiy

1916. Bull. Soc. Oural. Nat. 35, p. 5.
No locality given.

10. CRICETUS CRICETUS BABYLONICUS, Nehring

1903. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 360.
S.E. Bagdad.

11. CRICETUS CRICETUS TAURICUS, Ognev

1924. Rodents of North Caucasus, Rostov-on-Don, p. 19.
Neighbourhood of Simferopol, Crimea.

Genus 31. MESOCRICETUS, Nehring

1898. Mesocricetus, Nehring, Zool. Anz. p. 494.

Type Species.—*Cricetus nigricans*, Brandt.

Range.—Roumania, Bulgaria; Caucasus; Syria; N.-W. Persia (specimens in B.M.); Asia Minor(?) (probably extreme eastern portion, Ararat).

Number of Forms.—Six.

Characters.—Like *Cricetus*, but infraorbital foramen with no external plate, the foramen nearly evenly rounded on outer side, the zygomatic plate narrowed. Supraorbital ridges in those seen less prominent than in *Cricetus*, though in one case (the type of *auratus*) they tend to fuse on the forepart of the braincase. Palatal foramina relatively shorter, not approaching the toothrows. Interparietal small. Bullae relatively large. Palate extending behind toothrows. Pterygoid fossae deepened. Incisors very broad. Mandible as in *Cricetus*; coronoid process if anything relatively larger. Upper cheekteeth as in *Cricetus*, but the pits separating each pair of cusps wider, more important features of normal dentition, and apparently isolated more or less from birth. Lower cheekteeth as in *Cricetus*, though with wear in the few specimens in the British Museum there is a fairly constant tendency for the third molar to become the dominant tooth, and for M.1 to become the smallest tooth. This is, I believe, not an absolutely constant character.

Mammae more or less continuous, 14–22 (Argyropulo). It is interesting to note that all other Hamsters have 8 mammae, according to this author, there being no intermediate form known between these and the "multimammate" condition found in the present genus. Large cheekpouches present. The male genital organs differ from those of *Cricetus*, according to Argyropulo, though more resembling *Cricetus* apparently than *Cricetulus*. Ear relatively large; form thickset; limbs short, and feet very small. Digits unreduced; plantar pads 6. Tail extremely shortened (more so than in other Palaearctic genera). Colour pattern usually not so well marked as in *Cricetus*. Head and body about 120 mm. in fully adult, or up to 185 or more (according to Vinogradov up to 280).

Hamsters of this kind are interesting captivity subjects, and for their size show certain intelligence (perhaps more restlessness than actual thought). Unfortunately it is almost impossible for them to be taught not to bite. They are keen climbers in a cage and can evidently fall from almost any height within reason without coming to harm. I once saw one fall flat on his back from a

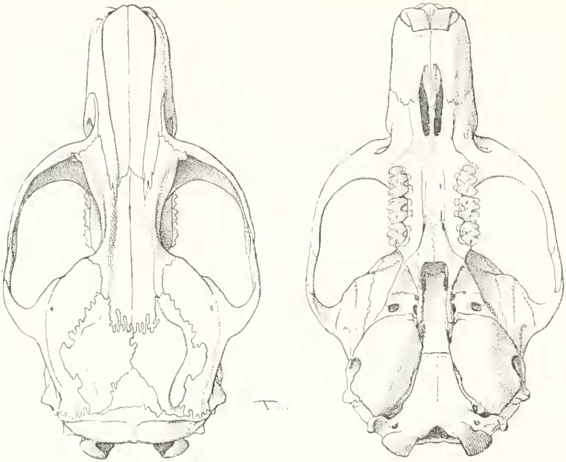

Fig. 26. Mesocricetus newtoni, Nehring.
B.M. No. 12.9.12.17, [illegible]; × $2\frac{1}{2}$.

Fig. 27. Mesocricetus newtoni, Nehring.
B.M. No. 12.9.12.17, [illegible]; × $2\frac{1}{2}$.

bridge which must have been quite five times his own height; I was convinced that he was killed, but he got up almost at once, apparently suffered not the slightest harm, and lived on for a year, being ultimately killed in a fight with his wife! They will never bother to climb down when they have reached the top of a cage, but just dive or throw themselves on to whatever happens to be below. They are quarrelsome to a degree, and it is a very difficult thing to keep two or more together for any length of time without a fatal fight occurring.

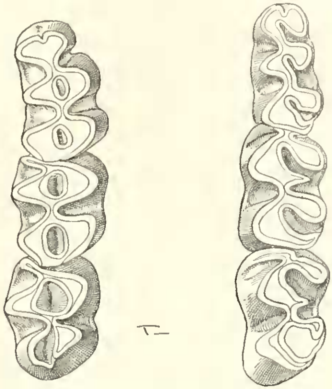

FIG. 28. MESOCRICETUS NEWTONI, Nehring.
Cheekteeth: B.M. No. 6.5.17.1, ♂; × 13.

They have amazing powers of recovery; I once saw one with her throat gashed open, but this healed up in a matter of a few days. Two and a half years seems to be the extreme length of life for these Hamsters; after this time they curl up and die of old age, or so has been my experience.

The cheekpouches are used a great deal, and will apparently take pieces of food half as big as the animal's head; at such times the swelling caused by the food may reach down to the animal's waist. They are prodigious breeders, as is well known; the period of gestation is only eleven days, and the young appear to take solid food in a fortnight, and to be fully adult at eleven weeks if not before. They are naked at birth, but hairy covering is developed about the sixth day; the mother carries them about in her mouth like a cat with kittens, which is a very amusing sight. The cheekpouches are usually emptied by the paw being pressed against the cheek, and brought forward. (These notes are based on *auratus*.)

Forms seen: *auratus*, *brandti*, *koenigi*, *newtoni*, *nigricans*.

The forms represented in London seem to me to be referable to two species, namely, (1) *auratus*, light brown above, and with no black marking below, or this scarcely developed; and (2) a darker species, with black markings apparent below, for which the oldest name would be *raddei*; *raddei* would thus include all forms except *auratus*. However, as I have no types except *auratus*, I follow the classification of Argyropulo, who retains three species. He states that *newtoni* is doubtfully distinguishable from *auratus*; but specimens in the B.M. are not in the least like *auratus*, but very similar to *raddei*. Aharoni states the form *brandti* is a race of *raddei*; Argyropulo refers it to *auratus*.

List of Named Forms

1. MESOCRICETUS AURATUS AURATUS, Waterhouse

1840. Ann. Mag. Nat. Hist. IV, p. 445.
Aleppo, Syria.

2. MESOCRICETUS AURATUS BRANDTI, Nehring

1898. Zool. Anz. XXI, p. 331.
Gouv. Tiflis, Transcaucasia. A race of *raddei* according to Aharoni. Specimens in B.M. resemble races of *raddei*, and not *auratus*.
Synonym: *koenigi*, Nehring, 1900, Zool. Anz. XXIII, p. 301. Caucasus; Kasikoporan on Tandurek-tschai, Gouv. Eriwan.

3. MESOCRICETUS RADDEI RADDEI, Nehring

1894. Zool. Anz. XVIII, p. 148.
Daghestan, Caucasus.

4. MESOCRICETUS RADDEI NIGRICULUS, Nehring

1898. Zool. Anz. XXI, p. 495.
Mountains of middle part of N. Caucasus.
Synonym: *nigricans*, Brandt. 1832, Ménétriès Cat. Rais. p. 22, Asia Minor; not of Lacepède.

5. MESOCRICETUS RADDEI AVARICUS, Ognev & Heptner

1927. Ann. Mag. Nat. Hist. 9, XIX, p. 142.
Near Village Aoul, Khumsakh, Avarsky district, Daghestan, Caucasus.

6. MESOCRICETUS NEWTONI, Nehring

1898. Zool. Anz. XXI, p. 329.
Schumla, E. Bulgaria.

Genus 32. MYSTROMYS, Wagner

1841. Mystromys, Wagner, Arch. für Naturg. p. 132.

Type Species.—*Mystromys albipes*, Wagner = *Otomys albicaudatus*, Smith.

Range.—Southern Africa; Albany district, Natal, Transvaal; (?)Tanganyika.

Number of Forms.—Three.

Characters.—Skull of the same general form as the South American *Auliscomys*, but rather more constricted in the interorbital region, this constriction carried further backwards, so that the braincase appears shortened. Supraorbital ridges faintly apparent in old animals. Zygomata widely spreading. Zygomatic plate almost straight anteriorly. Palate extending slightly behind level of last molars. Incisive foramina reaching toothrows. When cut the upper cheekteeth have a pattern of more or less opposite cusps and slanting folds; six cusps in M.1, but the front pair fusing in the adult; no subsidiary ridges in the main folds; the folds are two each side M.1, two outer, one inner M.2, as usual; the cusps retained, and the pattern not becoming truly prismatic, until old age, when the pattern tends to resemble that of *Phyllotis*, being nearly a series of transverse plates. The folds in the moderately young animal are well open, and suggest *Cricetus*, but the whole pattern is widely different, being simpler, lacking isolated pits between the cusps, etc. M.3 is strongly reduced. In the lower series, M.3 is small; the cusps are originally prominent; M.1 has originally two outer, three inner folds, but some of these are lost in the adult; M.2 with two folds each side originally; M.3 with one each side. Coronoid process of mandible well developed. The bullae are moderately large.

External form thickset, with very soft fur, relatively large ear; sole partly haired; foot narrow, rather short; tail in all seen either under half head and body length or just exceeding this measurement in a few, well haired; no cheekpouches (St. Leger). In the form *longicaudatus*, the tail as described is not shortened.

Remarks.—I am entirely at a loss to suggest the relationships of this genus, which seems not only isolated from the Palaearctic and Neotropical genera, but to have no marked generic characters, making it exceptionally difficult to place in the key. It might be remotely related to the *Cricetus* series; or it might be equally a member of the *Phyllotis* series. It is one of those unfortunate genera which starts life in one section of my key, and grows up into another!

Forms seen: *albicaudatus*, *fumosus*.

List of Named Forms

1. MYSTROMYS ALBICAUDATUS ALBICAUDATUS, Smith

1834. South Afr. Quart. Journ. ii, p. 148.
Albany district, S. Africa.
Synonym: *albipes*, Wagner, 1841, Arch. für Naturg. p. 132. S. Africa.
lanuginosus, Lichtenstein, 1842, Verz. Samml. Kaffernlande, p. 10.

2. MYSTROMYS ALBICAUDATUS FUMOSUS, Thomas & Schwann

1905. Proc. Zool. Soc. London, 1, p. 137.
Wakkerstroom, Transvaal.

3. MYSTROMYS LONGICAUDATUS, Noack

1887. Zool. Jahrb. ii, p. 246.
Gonda, N.W. Tanganyika.

Genus 33. HESPEROMYS, Waterhouse

1839. Hesperomys, Waterhouse, Zool. Voy. Beagle, Mamm. p. 75.

1837. Calomys, Waterhouse, Proc. Zool. Soc. London, p. 21. (*Mus bimaculatus*. Not of Geoffroy & D'Orbigny); see Thomas, Ann. Mag. Nat. Hist. 8, XVII, p. 141, 1916.

1926. PARALOMYS, Thomas, Ann. Mag. Nat. Hist. 9, XVII, p. 315. (*Phyllotis gerbillus*, Thomas.) Valid as a subgenus.

TYPE SPECIES.—*Mus bimaculatus*, Waterhouse.

RANGE.—South America: Peru, Bolivia, Paraguay, Uruguay, S.-E. Brazil (Minas Geraes), and Central and Northern Argentina (Buenos Aires, Jujuy, Cordova, etc.).

NUMBER OF FORMS.—Twenty-five.

CHARACTERS.—Skull with zygomatic plate strongly cut back above; supraorbital ridges not or scarcely marked; palate continuing behind last molars, and usually with lateral pits; interparietal well developed; zygoma slender, jugal short; coronoid process well developed; incisive foramina penetrating between front molars.

Upper cheekteeth usually cuspidate, very rarely taking on a laminate or slightly prismatic appearance; no subsidiary ridges traceable in the main outer folds, normally M.1 with usually six cusps, though the anterior pair may tend to fuse. As compared with a simple-toothed *Peromyscus*, the pattern while generally similar differs in the fact that the cusps tend less to be alternating; but the folds are strongly curved backwards, and rather deep, as in *Peromyscus* and unlike *Akodon*. M.3 moderately, or sometimes considerably, reduced. Lower cheekteeth: M.3 more or less S-shaped; M.1 with six cusps and posterointernal heel, the folds separating these deep, the cusps more alternating than in the upper series; M.2 with four cusps and posterointernal heel. In the upper molars, there are two folds each side of M.1, and two outer, one inner in M.2.

The large species *fecundus* and *venustus* while agreeing with the majority of the genus in external characters seem in cranial and dental characters to lead straight into *Graomys*.

Mammae variable: 2—2=8 or 3—2=10 or a continuous series totalling 14 (5—2=14 given for some species); evidently not constant, and differing sometimes in specimens of the same species. Form Mouselike; feet narrow, usually with D.5 of hindfoot noticeably reduced; ear prominent, but not as enlarged as is usual in *Graomys* or normal *Phyllotis*; tail moderately haired, usually a little shorter than head and body, never much longer. Fur usually not specially thick, but *lepidus* is a very soft-furred form. The tail is less than half head and body in this species; the same may be noted for *ducilla*; but neither are well-known species.

PARALOMYS proposed as a full genus for the Peruvian species *gerbillus* differs markedly from *Hesperomys* in its Gerbil-like coloration; D.5 in the hindfoot is not reduced; the soles are naked, the plantar pads normal. Tail well haired, subequal in length to head and body; ear prominent. Mammary formula 2—2=8 (Gyldenstolpe). Dentition perhaps a little more specialized than *Hesperomys* is normally, but cusps clear; main outer fold of M.2 more widened than is usual, and often split into two portions, the one curving forward, the other backward; M.3 small; M.2 with anteroexternal fold nearly or completely suppressed. Cranial characters as *Hesperomys*. I do not think the differences enumerated here are of more than subgeneric value, and the species, though very distinct, seems to belong in dental characters with *Hesperomys* rather than with *Eligmodontia* or *Phyllotis*.

The mammary formulas given by Gyldenstolpe are: 5—2 = 14 in *laucha musculinus* and *laucha cortensis*; 2—2 = 8 in *tener*; 3—2 = 10 in *venustus*; 5—2 = 14 in *fecundus*, and 2—2 = 8 in both races of *frida*. It is apparently unknown, however, in many species. *H. fecundus* and *H. expulsus* are the largest species (over 120 in type specimen); others are usually under 115, often under 100.

Forms seen: *argurus*, *boliviae*, *bimaculatus*, *callosus*, *callidus*, *carillus*, *cordovensis*, *cortensis*, *ducilla*, *expulsus*, *fecundus*, *frida*, *gerbillus*, *gracilipes*, *lepidus*, *marcarum*, *miurus*, *muriculus*, *murillus*, *musculinus*, *sorella*, *tener*, *venustus*.

List of Named Forms

Subgenus *Hesperomys*, Waterhouse

1. HESPEROMYS BIMACULATUS BIMACULATUS, Waterhouse

1837. Proc. Zool. Soc. London, p. 18.
Maldonado, Uruguay.

2. HESPEROMYS BIMACULATUS BONARIENSIS, Osgood

1933. Field. Mus. Nat. Hist. Publ. Zool. ser. XX, p. 14.
Torrecita, Province of Buenos Aires, Argentina.

3. HESPEROMYS CALLOSUS CALLOSUS, Rengger

1830. Säugethiere von Paraguay, p. 231.
Rio Paraguay, north of Villa Real, Paraguay.

4. HESPEROMYS CALLOSUS BOLIVIAE, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 253.
Rio Solocame, Central Bolivia.

5. HESPEROMYS CARILLUS CARILLUS, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 133.
Choro, Rio Secure, Central Bolivia.

6. HESPEROMYS CARILLUS ARGURUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, IV, p. 130.
Abrapampa, Jujuy Province, N.-W. Argentina.

7. HESPEROMYS CARILLUS MARCARUM, Thomas

1917. Smiths. Misc. Coll. LXVIII, no. 4, p. 1.
Lauramarca, Cuzco district, Peru.

8. HESPEROMYS DUCILLA, Thomas

1901. Ann. Mag. Nat. Hist. 7, VII, p. 182.
San Antonio, Lake Titicaca, S.-E. Peru.

9. HESPEROMYS EXPULSUS, Lund

1841. K. Danske. Vidensk. Selsk, Afhandl. VIII, p. 280.
Lagoa Santa, Rio das Valhas, S.-W. Minas Geraes, E. Brazil.

10. HESPEROMYS FECUNDUS, Thomas

1926. Ann. Mag. Nat. Hist. 9, XVII, p. 321.
Tablada, Tarija district, S. Bolivia.

11. HESPEROMYS FRIDA FRIDA, Thomas

1917. Smiths. Misc. Coll. LXVIII, no. 4, p. 1.
Chospyoc, Cuzco district, Peru.

12. HESPEROMYS FRIDA MIURUS, Thomas
1926. Ann. Mag. Nat. Hist. 9, XVII, p. 314.
Yana Mayo, Rio Tarma, Junin district, Peru.

13. HESPEROMYS GRACILIPES, Waterhouse
1837. Proc. Zool. Soc. London, p. 19.
Bahia Blanca, South Buenos Aires Province, S.-E. Argentina.

14. HESPEROMYS LAUCHA LAUCHA, Desmarest
1819. Nouv. Dict. Hist. Nat. XXIX, p. 65.
Buenos Aires, E. Argentina.

15. HESPEROMYS LAUCHA CORTENSIS, Thomas
1920. Ann. Mag. Nat. Hist. 9, V, p. 190.
Jujuy City, N.-W. Argentina.

16. HESPEROMYS LAUCHA MUSCULINUS, Thomas
1913. Ann. Mag. Nat. Hist. 8, XI, p. 138.
Maimara, Central Jujuy, N.-W. Argentina.

17. HESPEROMYS LEPIDUS, Thomas
1884. Proc. Zool. Soc. London, p. 454.
Junin, Lima district, Central Peru.

18. HESPEROMYS MURICULUS, Thomas
1921. Ann. Mag. Nat. Hist. 9, VIII, p. 623.
San Antonio, Rio Parapiti, S.-E. Bolivia.

19. HESPEROMYS MURILLUS MURILLUS, Thomas
1916. Ann. Mag. Nat. Hist. 8, XVII, p. 183.
La Plata City, Buenos Aires Province, E. Argentina.

20. HESPEROMYS MURILLUS CORDOVENSIS, Thomas
1916. Ann. Mag. Nat. Hist. 8, XVII, p. 184.
Yacanto, Sierra de Villa Dolores, Cordova Province, Central Argentina.

21. HESPEROMYS SORELLA, Thomas
1900. Ann. Mag. Nat. Hist. 7, VI, p. 297.
South of Huamachuca, N.-W. Peru.

22. HESPEROMYS TENER, Winge
1887. E. Museo Lundii, 1, no. 3, p. 15.
Lagoa Santa, Rio das Velhas, S.-W. Minas Geraes, E. Brazil.

23. HESPEROMYS VENUSTUS VENUSTUS, Thomas
1894. Ann. Mag. Nat. Hist. 6, XIV, p. 359.
Cosquin, Cordova Province, Central Argentina.

24. HESPEROMYS VENUSTUS CALLIDUS, Thomas
1916. Ann. Mag. Nat. Hist. 8, XVII, p. 182.
Goya, Corrientes, E. Argentina.

Subgenus *Paralomys*, Thomas

25. HESPEROMYS GERBILLUS, Thomas
1900. Ann. Mag. Nat. Hist. 7, V, p. 151.
Piura, N.-W. Peru.

Genus 34. ELIGMODONTIA, Cuvier

1837. ELIGMODONTIA, Cuvier, Ann. Sci. Nat. Zool. 2, VII, p. 168.

TYPE SPECIES.—*Eligmodontia typus*, Cuvier.

RANGE.—Bolivia, Argentina, Patagonia.

NUMBER OF FORMS.—Six.

CHARACTERS.—Skull with no supraorbital ridges; braincase rather broad; zygoma slender. Bullae relatively large. Zygomatic plate and palate as *Hesperomys*. Pterygoid fossae shallow. Coronoid process of mandible strongly reduced. Dentition with more prismatic effect in the majority of specimens than in *Hesperomys*; M.3 often very reduced, and simpler; folds of teeth tending to be more open. In age, the pattern may be *Phyllotis*-like.

Mammae 2—2=8. Tail subequal in length to head and body, or longer than this measurement; relatively well haired; hindfoot narrow, with D.5 long; "Palms and soles hairy; in the former, the outer part is occupied by two large hairy cushions, the anterior of which bears two outer digital pads, and the posterior the outer carpal pad as quite inconspicuous smooth places on otherwise hairy surface . . . of the two cushions, the posterior is the largest and most conspicuous. Soles also with hairy cushions, the posterior solepad obsolete" (Thomas). Ear prominent.

This is not a well differentiated genus, the exact position of which I am not certain. The size is small, usually under 100 head and body.

Forms seen: *elegans*, *hirtipes*, *jucundus*, *moreni*, *marica*, "*pamparum*," *typus*.

LIST OF NAMED FORMS

1. ELIGMODONTIA ELEGANS, Waterhouse

1837. Proc. Zool. Soc. London, p. 19.
Bahia Blanca, S. Buenos Aires Province, S.-E. Argentina.
Synonym: *morgani*, Allen, 1901, Bull. Amer. Mus. Nat. Hist. XIV, p. 409. Patagonia; Basaltic Cañons south-east of Lake Buenos Aires.
morgani pamparum, Thomas, 1913, Ann. Mag. Nat. Hist. 8, XII, p. 572. Bahia Blanca, Argentina.

2. ELIGMODONTIA HIRTIPES HIRTIPES, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 225.
Challapata, Lake Poopo, Bolivia.

3. ELIGMODONTIA HIRTIPES JUCUNDA, Thomas

1919. Ann. Mag. Nat. Hist. 9, IV, p. 131.
Abrapampa, Jujuy, N.-W. Argentina.

4. ELIGMODONTIA MARICA, Thomas

1918. Ann. Mag. Nat. Hist. 9, II, p. 483.
Chumbicha, Catamarca Province, N.-W. Argentina.

5. ELIGMODONTIA MORENI, Thomas

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 307.
Chilecito, Rioja Province, W. Argentina.

6. ELIGMODONTIA TYPUS, Cuvier
1837. Ann. Sci. Nat. Zool. 2, VII, p. 168.
Corrientes, E. Argentina.

Genus 35. GRAOMYS, Thomas

1916. Graomys, Thomas, Ann. Mag. Nat. Hist. 8, XVII, p. 141.

Type Species.—*Mus* (*Phyllotis*) *griseoflavus*, Waterhouse.

Range.—South America: Bolivia, Paraguay, Argentina, Patagonia.

Number of Forms.—Ten.

Characters.—Skull differing from *Phyllotis* in that the supraorbital ridges are generally developed, and the interorbital region is comparatively broad, and evenly divergent backwards from behind the anterior zygomatic root; frontals relatively broad. Zygomatic plate concave anteriorly, and sharply cut back above. Palate and incisive foramina about as *Phyllotis*. Bullae relatively large. Coronoid process rather short. Dentition in the majority like that of *Phyllotis* (below). M.2 usually with clear traces of antero-external fold, as in subgenus *Auliscomys*. The cusps are not well marked, and the teeth agree with *Phyllotis* in being much more flatcrowned than is normal in *Hesperomys*. In all these genera, however, there is certain individual variation, which makes their classification excessively difficult.

Mammae 2—2=8. Tail fully haired, often slightly pencilled terminally, and usually much longer than head and body. Sole naked; digits normal; ear as a rule very prominent. Size moderately large; normally well over 100 head and body.

Remarks.—Should perhaps be considered as a subgenus of *Phyllotis* only, but the cranial characters seem quite constant, and differentiate clearly between the two genera.

Forms seen: *chacoensis*, *cachinus*, *centralis*, *domorum*, *edithae*, *griseoflavus*, *lockwoodi*, *medius*, *taterona*.

List of Named Forms

1. GRAOMYS EDITHAE, Thomas
1919. Ann. Mag. Nat. Hist. 9, III, p. 495.
Otro Cerro, Catamarca Province, N.-W. Argentina.

2. GRAOMYS GRISEOFLAVUS GRISEOFLAVUS, Waterhouse
1837. Proc. Zool. Soc. London, p. 28.
Mouth of Rio Negro, N. Patagonia.

3. GRAOMYS GRISEOFLAVUS CACHINUS, Allen
1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 409.
Upper Rio Cachi, Salta Province, N.-W. Argentina.

4. GRAOMYS GRISEOFLAVUS CENTRALIS, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 240.
Cruz del Eje, Cordova Province, Central Argentina.

5. GRAOMYS GRISEOFLAVUS CHACOENSIS, Allen

1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 408.
Waikthlatingwayalwa, N. Chaco, Paraguay.

6. GRAOMYS GRISEOFLAVUS DOMORUM, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 132.
Tapacari, N. Bolivia.

7. GRAOMYS HYPOGAEUS, Cabrera

1934. Notas. Prelim. Mus. La Plata, 3, p. 124.
Catamarca, Argentina.

8. GRAOMYS LOCKWOODI, Thomas

1918. Ann. Mag. Nat. Hist. 9, I, p. 187.
Manuel Elordi, Vermejo, Salta Province, N.-W. Argentina.

9. GRAOMYS MEDIUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 494.
Chumbicha, Catamarca, N.-W. Argentina.

10. GRAOMYS TATERONA, Thomas

1926. Ann. Mag. Nat. Hist. 9, XVII, p. 320.
Tablada, Tarija district, S. Bolivia.

Genus 36. PHYLLOTIS, Waterhouse

1837. Phyllotis, Waterhouse, Proc. Zool. Soc. London, p. 28.
1915. Auliscomys, Osgood, Field. Mus. Nat. Hist. Zool. ser. X, no. 13, p. 190. (*Reithrodon pictus*, Thomas.) Valid as a subgenus.
1916. Galenomys, Thomas, Ann. Mag. Nat. Hist. 8, XVII, p. 143. (*Phyllotis garleppii*, Thomas.) Valid as a subgenus.

Type Species.—*Mus darwinii*, Waterhouse.

Range.—South America: Ecuador, Peru, Bolivia, Chile, Argentina, south to Southern Patagonia.

Number of Forms.—Thirty-six.

Characters.—Nasals long, broad, often broadened anteriorly to a certain degree; interparietal well developed; strong interorbital constriction is present, and supraorbital ridges scarcely developed; interorbital region not evenly divergent backwards. Normally the zygomata are not widely spreading. The type of *nogalaris* is a partial exception to this character, however, and forms a connecting link with *Auliscomys*; also the supraorbital ridges are more apparent in this species. Zygomatic plate cut sharply back above; palate and incisive foramina as in *Hesperomys*; zygoma slender; bullae not enlarged. The cheekteeth are more or less flat when cut, so far as seen, and tend to take on a more prismatic appearance than in *Hesperomys*, with the cusps not apparent; in the adult of the majority of the species, the upper molars wear down more or less to a pattern of transverse plates, with two folds each side of M.1, and one each side of M.2 and M.3 (M.2 lacking the usual anteroexternal fold, and M.3 with the folds tending to isolate as islands). The outer fold of M.2 may be enlarged. The folds alternate much less than in *Sigmodon* and *Holochilus*, and are altogether weaker, and there is little tendency for closed triangles to be formed, and the folds are as a rule more open. The molars are less Microtine and strongly prismatic, and less hypsodont than in *Chinchillula* and *Andinomys*, the dentition being altogether weaker. But one species, *P. xanthopygus*, appears to be advancing in the direction of these two genera; it is more prismatic than the majority. M.3 is of medium size in the genus. *P. amicus* is the least hypsodont, most *Hesperomys*-like species in dentition, but the difference between it and *Hesperomys* appears quite well marked. Lower teeth: M.1 with two inner, and two outer persistent folds, and usually a small posterointernal fold; M.2 with one persistent inner fold, and one outer one; also occasionally an antero-external fold (much reduced), and sometimes a minute posterointernal one. Cusps much less marked than in *Hesperomys*, and a strong tendency for the teeth to become flatcrowned. M.3 lower simple, with one well-marked outer fold, and a very shallow anterointernal one which may wear out. Upper incisors plain.

Mammae 2—2=8. Tail usually longer than head and body, sometimes extremely so; feet normal, with fifth digit hindfoot not reduced; fur soft; ear large, sometimes extremely so. (These notes based on the typical subgenus.)

AULISCOMYS (Bolivia, Peru, Argentina, and to South Patagonia) was proposed as a subgenus of *Phyllotis* by Osgood. The skull has more widely spreading zygomata than in normal *Phyllotis*, and the interorbital region is usually more constricted. Incisors slightly pro-odont, and may be very faintly grooved, or plain. Palate as in *Phyllotis*. Cheekteeth essentially as in normal *Phyllotis* as a rule, occasionally rather more prismatic; the anteroexternal fold of M.2 usually less reduced; M.3 tending sometimes to be rather less reduced. Tail proportionately shorter than is usual in *Phyllotis*; of medium length, or in *sublimis* and *leucurus* strongly reduced, little over 50 per cent of head and body.

This group was transferred by Thomas to *Euneomys* as a subgenus. But the molars of all *Auliscomys* seen are of *Phyllotis* type, and quite different from the rather highly specialized *Holochilus*-like type found in *Euneomys*, in which the folds are oblique, deep, and narrow; the grooving of the incisors is variable and when present very weak in *Auliscomys*; and the palate posteriorly is as in *Phyllotis*, not *Euneomys*; while as noted *P. nogalaris* is intermediate in cranial characters between *Auliscomys* and *Phyllotis*, though certainly *Auliscomys* resembles *Euneomys* in cranial characters. There seems not the slightest need to give *Auliscomys* generic rank, as has been done.

GALENOMYS is based on one very little known form, of which there is only one broken skull in London; it seems a very distinct type, and perhaps might be given generic rank. The soles are partly haired (usually naked in *Phyllotis* and *Auliscomys*); the tail is very shortened, being only about 30 per cent of head and body length; the zygoma is narrow, but rises rather abruptly anteriorly to a considerable height. The incisors are rather pro-odont, but plain; the cheekteeth are as in *Phyllotis*.

In the typical subgenus *Phyllotis*, *P. amicus* and allies would probably form a species group, characterized by very small size, very long tail and large ears, and relatively brachyodont teeth; on dental characters probably *xanthopygus* would also have to be regarded as type of a species group. According to Gyldenstolpe, *osilae*, *oreigenus*, and *elegantulus* are allied to *amicus*.

P. amicus and allies are usually under 100 mm. head and body length; the other species usually exceed this measurement. (To about 150 mm.)

Forms seen: *andium*, *abrocodon*, *alsus*, *amicus*, *arenarius*, *boliviensis*, *darwinii*, *elegantulus*, *flavidior*, *garleppii*, *haggardi*, *leucurus*, *limatus*, *lutescens*, *maritimus*, *montanus*, *micropus*, *melanius*, *magister*, *nogalaris*, *posticalis*, *pictus*, *ricardulus*, *sublimis*, *stenops*, *tucumanus*, *vaccarum*, *wolffsohni*, *xanthopygus*.

List of Named Forms

Subgenus *Phyllotis*, Waterhouse

1. PHYLLOTIS ABROCODON, Thomas
1926. Ann. Mag. Nat. Hist. 9, XVII, p. 316.
Oroya, Lake Junin, Central Peru.

2. PHYLLOTIS AMICUS AMICUS, Thomas
1900. Ann. Mag. Nat. Hist. 7, V, p. 355.
Tolon, Cajamarca district, N.-W. Peru.

3. PHYLLOTIS AMICUS MARITIMUS, Thomas
1900. Ann. Mag. Nat. Hist. 7, VI, p. 296.
Eten, N.-W. Peru.

4. PHYLLOTIS AMICUS MONTANUS, Thomas
1900. Ann. Mag. Nat. Hist. 7, VI, p. 297.
Rio Ustihe, Uramarca, N.-W. Peru.

5. PHYLLOTIS ANDIUM ANDIUM, Thomas
1912. Ann. Mag. Nat. Hist. 8, X, p. 409.
Cañar Province, Central Ecuador.

6. PHYLLOTIS ANDIUM STENOPS, Osgood
1914. Field. Mus. Nat. Hist. Zool. ser. X, no. 12, p. 165.
Rio Utcubamba, Chachapoyas, N. Peru.
(According to Thomas a synonym of *a. andium*.)

7. PHYLLOTIS ANDIUM TAMBORUM, Osgood
1914. Field. Mus. Nat. Hist. Zool. ser. X, no. 12, p. 165.
Tambo Carrizal, east of Balsas, N. Peru.

8. PHYLLOTIS ARENARIUS, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 224.
Uyuni, Potosi, Central Bolivia.

9. PHYLLOTIS DARWINII DARWINII, Waterhouse
1837. Proc. Zool. Soc. London, p. 28.
Coquimbo, Central Chile.
Synonym: *dolichonyx*, Philippi, 1900, An. Mus. Nac. d. Chile, 1, p. 58. Coquimbo Province, Chile.
melanotis, Philippi, same reference, p. 39. Atacama Province, Chile.
campestris, Philippi, same reference, p. 38. Choapa, Chile.
dichrous, Philippi, same reference, p. 14. Peine, Santiago Province, Chile.

(*Phyllotis darwinii darwinii*) *mollis*, Philippi, same reference, p. 23. Santiago Province, Chile.
illapelinus, Philippi, same reference, p. 28. Illapel, Chile.
segethi, Philippi, same reference, p. 30. Peine, Santiago Province, Chile.

10. PHYLLOTIS DARWINII LIMATUS, Thomas
1912. Ann. Mag. Nat. Hist. 8, X, p. 407.
Chosica, Lima district, W. Peru.

11. PHYLLOTIS DARWINII POSTICALIS, Thomas
1912. Ann. Mag. Nat. Hist. 8, X, p. 406.
Galera, south-west of Oroya, Junin district, Peru.

12. PHYLLOTIS DARWINII VACCARUM, Thomas
1912. Ann. Mag. Nat. Hist. 8, X, p. 408.
Los Vacas, Mendoza, Argentina.

13. PHYLLOTIS DEFINITUS, Osgood
1915. Field. Mus. Nat. Hist. Zool. ser. X, no. 13, p. 189.
Macate, north-east of Chimbote, W. Peru.

14. PHYLLOTIS ELEGANTULUS, Thomas
1913. Ann. Mag. Nat. Hist. 8, XI, p. 139.
Pallatanga, Central Ecuador.

15. PHYLLOTIS FRUTICICOLUS, Anthony
1922. Amer. Mus. Nov. no. 32, p. 1.
Guachanama, S. Ecuador.

16. PHYLLOTIS FUSCUS, Anthony
1924. Amer. Mus. Nov. no. 114, p. 1.
Contrayerbas, Azuay Province, S. Ecuador.

17. PHYLLOTIS HAGGARDI, Thomas
1898. Ann. Mag. Nat. Hist. 7, II, p. 270.
Mt. Pichincha, W. Ecuador.

18. PHYLLOTIS LUTESCENS, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 131.
Choro, Rio Securé, Central Bolivia.

19. PHYLLOTIS MAGISTER, Thomas
1912. Ann. Mag. Nat. Hist. 8, X, p. 406.
Arequipa, S. Peru.

20. PHYLLOTIS MELANIUS, Thomas
1913. Ann. Mag. Nat. Hist. 8, XI, p. 407.
Porvenir, Bolivar Province, Central Ecuador.

21. PHYLLOTIS NOGALARIS, Thomas
1921. Ann. Mag. Nat. Hist. 9, VIII, p. 611.
Higuerilla, Valle Grande Dept. Jujuy, N.-W. Argentina.

22. PHYLLOTIS OREIGENUS, Cabrera
1926. Rev. Chilena de Hist. Nat. XXX, p. 319.
Laguna Blanca, Catamarca Province, N.-W. Argentina.

23. PHYLLOTIS OSILAE, Allen
1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 44.
Osila, S. Peru.

24. PHYLLOTIS RICARDULUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 493.
Otro Cerro, Catamarca Province, N.-W. Argentina.

25. PHYLLOTIS TUCUMANUS, Thomas

1912. Ann. Mag. Nat. Hist. 8, X, p. 408.
Cunbre de Mala-mala, Sierra de Tucuman, Tucuman Province, N.-W. Argentina.

26. PHYLLOTIS WOLFFSOHNI, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 131.
Tapacari, N. Bolivia.

27. PHYLLOTIS XANTHOPYGUS, Waterhouse

1837. Proc. Zool. Soc. London, p. 28.
Santa Cruz, S. Patagonia.

Subgenus *Auliscomys*, Osgood

28. PHYLLOTIS BOLIVIENSIS BOLIVIENSIS, Waterhouse

1846. Ann. Mag. Nat. Hist. 1, XVII, p. 483.
Potosi, Central Bolivia.
Synonym: *waterhousii*, Trouessart, 1881, Bull. Soc. Études Sci. d'Angers (1880) fasc. iii, p. 138.

29. PHYLLOTIS BOLIVIENSIS FLAVIDIOR, Thomas

1902. Ann. Mag. Nat. Hist. 7, X, p. 248.
Bateas, Caylloma, S. Peru.

30. PHYLLOTIS DECOLORATUS, Osgood

1915. Field. Mus. Nat. Hist. Zool. ser. X, no. 13, p. 191.
Tirapata, Puno district, S.-E. Peru.

31. PHYLLOTIS LEUCURUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, IV, p. 129.
La Lagunita, Maimara, Jujuy, N.-W. Argentina.

32. PHYLLOTIS PICTUS, Thomas

1884. Proc. Zool. Soc. London, p. 457.
Junin, Lima district, Central Peru.

33. PHYLLOTIS MICROPUS MICROPUS, Waterhouse

1837. Proc. Zool. Soc. London, p. 17.
Santa Cruz, S. Patagonia.

34. PHYLLOTIS MICROPUS ALSUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 202.
Maiten, Chubut Territory, N.-W. Patagonia.

35. PHYLLOTIS SUBLIMIS, Thomas

1900. Ann. Mag. Nat. Hist. 7, VI, p. 467.
Rinconado Malo Pass, Caylloma, S. Peru.

Subgenus *Galenomys*, Thomas

36. PHYLLOTIS GARLEPPII, Thomas

1898. Ann. Mag. Nat. Hist. 7, I, p. 279.
Esperanza, near Mt. Sahama, Central Bolivia.

Genus 37. CHINCHILLULA, Thomas

1898. CHINCHILLULA, Thomas, Ann. Mag. Nat. Hist. 7, I, p. 280.

TYPE SPECIES.—*Chinchillula sahamae*, Thomas.

RANGE.—Bolivia, extending into Peru.

NUMBER OF FORMS.—One.

CHARACTERS.—Skull in general not unlike that of *Andinomys*; supraorbital ridges weak or absent; frontals relatively broad; interparietal large. Zygomatic plate scarcely cut back above, slanting backwards slightly from its lower border, but nearly straight. Palate about extending to posterior portion of toothrows. Molars very hypsodont; the folds two each side M.1, one each side M.2 and M.3, the enamel loops nearly straight; M.3 of moderate size. The pattern wears down, but is traceable even in extreme age, and in some ways approaches that of *Irenomys*, though much less angular than in this genus. Lower teeth like those of the upper series, but M.2 with a vestigial anteroexternal fold, and the inner folds deeper than the outer ones. Teeth flatcrowned when cut.

Fur very soft, and with specialized and striking colour-pattern. Tail considerably shorter than head and body, fully haired. Feet broad, with normal pads; digits normal. Ear very large.

Forms seen: *sahamae*.

LIST OF NAMED FORMS

1. CHINCHILLULA SAHAMAE, Thomas

1898. Ann. Mag. Nat. Hist. 7, I, p. 280.
Esperanza, near Mt. Sahama, Central Bolivia.

Genus 38. IRENOMYS, Thomas

1919. IRENOMYS, Thomas, Ann. Mag. Nat. Hist. 9, III, p. 201.

TYPE SPECIES.—*Reithrodon longicaudatus*, Philippi.

RANGE.—Southern Chile.

NUMBER OF FORMS.—One.

CHARACTERS.—Skull (one adult seen only) with marked interorbital constriction, broad braincase; incisive foramina long, penetrating between toothrows; zygomatic plate straight anteriorly. Upper incisors grooved. Upper cheekteeth extremely hypsodont, laminate, three laminae on M.1, two on M.2, two on M.3; each lamina separated by an inner and an outer re-entrant fold, these folds deep and opposite to each other, nearly meeting in middle line of tooth; two inner and two outer folds in M.1, one each side in other teeth; M.3 with a small outer fold in posterior lamina. A young skull, cutting, shows an almost identical pattern. The pattern is like that of the Gerbil *Meriones*, except that M.3 is not reduced, and is about the most simplified type of dentition in the subfamily. Lower molars similar, but slightly more complex; M.2 with traces of an anteroexternal cusp; M.3 with this cusp, and also with the outer fold very wide, the inner one obsolete. In the adult skin seen, the tail is much longer than the head and body; moderately haired, the end faintly tufted. Fur very thick. Hindfoot long, narrow, the digit pads rather thickened. Ear large.

Forms seen: *longicaudatus*, "*mochae*."

List of Named Forms

1. IRENOMYS LONGICAUDATUS, Philippi

1900. An. Mus. Nac. de Chile, 1, p. 64.

Coast region of W. Patagonia, Chile.

Synonym: (?)*mochae*, Philippi, 1900, An. Mus. Nac. de Chile, 1, p. 42. Based on an immature example. Mocha Island, Chile. Probably best regarded as unidentifiable.

Genus 39. NEOTOMYS, Thomas

1894. Neotomys, Thomas, Ann. Mag. Nat. Hist. 6, XIV, p. 346.

Type Species.—*Neotomys ebriosus*, Thomas.

Range.—Known from Peru, and North-west Argentina.

Number of Forms.—Two.

Characters.—Skull with extreme interorbital constriction, and supraorbital ridges not strong; interparietal well developed; nasals abruptly and abnormally expanded anteriorly; zygomatic plate strongly cut back above; incisive foramina long, prominent, the septum dividing them very broad; palate with deep pits situated each side in posterior portion, between which runs a thin raised ridge, the bony palate more or less ending on level of second molars. Bullae medium. Mandible with lower border heavy, well ridged, the coronoid process much reduced. Incisors very broad, the upper ones with a clear and narrow groove situated almost at outer corner of tooth. Upper cheekteeth: M.1 and M.2 similar in elements to *Sigmodon*, but the folds, though narrow, are straighter, so that the first molar is more or less formed by an anterior loop, two alternating closed triangles, and a partially divided posterior loop. M.2 like M.1 but with no anterointernal fold. M.3 complex, larger than M.2, with two inner, three outer folds. In old age the pattern evidently becomes more *Sigmodon*-like. M.3 always complex. Lower molars: M.1 with two outer, three inner folds; M.2 with one outer, two inner folds; M.3 not enlarged, more or less S-shaped; the folds and lobes of the lower teeth straight, more prismatic in appearance than *Sigmodon*, and M.2 evidently remaining more complex.

Mammae 2—2=8. Fur very thick; tail shorter than head and body, well haired; digits not abnormal; form thickset, but size relatively small, or moderate. I have seen no specimens in which the teeth are cutting.

Forms seen: *ebriosus*, *vulturnus*.

List of Named Forms

1. NEOTOMYS EBRIOSUS, Thomas

1894. Ann. Mag. Nat. Hist. 6, XIV, p. 348.
Vitoc Valley, Central Peru.

2. NEOTOMYS VULTURNUS, Thomas

1921. Ann. Mag. Nat. Hist. 9, VIII, p. 612.
Sierra de Zenta, Jujuy Province, N.-W. Argentina.

Genus 40. REITHRODON, Waterhouse

1837. Reithrodon, Waterhouse, Proc. Zool. Soc. London, p. 29.

Type Species.—*Reithrodon typicus*, Waterhouse.

Range.—Uruguay, Argentina, Chile, Patagonia.

Number of Forms.—Ten.

Characters.—Skull with supraorbital ridges weak or absent; abnormal interorbital constriction present, this carried far backwards, so that braincase is shortened; rostrum heavy; interparietal well developed. Zygomatic plate abnormal, with a very powerful forwardly projecting process present, under which it is concave, and over which it is very sharply cut back above, the general effect more exaggerated than in *Sigmodon* and other genera. Bullae medium. Zygoma narrow. Incisive foramina abnormally long, extending from back of incisors to about the middle of M.1. Palate considerably extended behind toothrows, and deeply excavated each side, with well-marked lateral pits in posterior portion. Posterior nares contracted; pterygoid fossae deep. The upper cheekteeth are near *Holochilus*, except that M.3 is not specially enlarged; the folds are less oblique than in *Euneomys*, which was formerly included in the genus, but which seems to have a less angular dentition as well as differing in the S-shaped M.2 and in cranial characters; M.2 is more complex in this genus, with two outer folds, and one inner one; M.3 has two persistent outer folds, and one inner one; the second outer one curves backwards and sometimes may cut right across the posteroexternal part of the tooth. Teeth rather strongly hypsodont, and pattern evidently preserved until extreme age. The angles as a rule are less sharply projecting than in *Holochilus*. Lower molars: folds as *Holochilus*; the anterior border of M.1, however, with usually a pointing projection in front, which may have a marked fold each side of it, in which case there are three outer and four inner folds, but this structure evidently suppressed with wear. It is interesting to note that a young specimen of this genus with the teeth just cutting has a pattern of the first molar (the sole tooth visible) almost exactly as in *Andinomys*. Upper incisors grooved.

Mammae 2—2=8. Fur thick and soft. Ear relatively large. Hindfoot long, the sole partly haired, D.5 and the hallux considerably shorter than the three centre digits; tail completely haired, about half head and body length, or slightly more than this.

Forms seen: *caurinus*, *currentium*, *cuniculoides*, *evae*, *flammarum*, *hatcheri*, *marinus*, *pampanus*, *typicus*.

List of Named Forms

1. REITHRODON AURITUS AURITUS, Desmarest

1819. Nouv. Dict. d'Hist. Nat. 2e. ed. art. Rat. esp. 25.
Pampas south of Buenos Aires City, E. Argentina.
Synonym: *cuniculoides pampanus*, Thomas, 1916, Ann. Mag. Nat. Hist. 8, XVIII, p. 304. S. Buenos Aires Province, Argentina.

2. REITHRODON AURITUS MARINUS, Thomas

1920. Ann. Mag. Nat. Hist. 9, V, p. 474.
Mar del Plata, south-eastern sea coast of Buenos Aires Province, Argentina.

3. REITHRODON CAURINUS, Thomas

1920. Ann. Mag. Nat. Hist. 9, V, p. 473.
Otro Cerro, Catamarca Province, N.-W. Argentina.

4. REITHRODON CUNICULOIDES CUNICULOIDES, Waterhouse

1837. Proc. Zool. Soc. London, p. 30.
Santa Cruz, E. Patagonia.
Synonym: (?)*pachycephalus*, Philippi, 1900, An. Mus. Nac. de Chile, I, p. 42. Straits of Magellan.

5. REITHRODON CUNICULOIDES EVAE, Thomas

1927. Ann. Mag. Nat. Hist. 9, XIX, p. 652.
Zapala, Neuquen Territory, W. Argentina.

6. REITHRODON CUNICULOIDES FLAMMARUM, Thomas

1912. Ann. Mag. Nat. Hist. 8, X, p. 411.
Spring Hill, N. Tierra del Fuego.

7. REITHRODON CUNICULOIDES HATCHERI, Allen

1903. Bull. Amer. Mus. Nat. Hist. XIX, p. 191.
Upper Rio Chico de Santa Cruz, W. Patagonia.
(According to Thomas probably identical with *c. cuniculoides*.)

8. REITHRODON CUNICULOIDES OBSCURUS, Allen

1903. Bull. Amer. Mus. Nat. Hist. XIX, p. 190.
Punta Arenas, Straits of Magellan, S. Chile.

9. REITHRODON TYPICUS TYPICUS, Waterhouse

1837. Proc. Zool. Soc. London, p. 30.
Maldonado, Uruguay.

10. REITHRODON TYPICUS CURRENTIUM, Thomas

1920. Ann. Mag. Nat. Hist. 9, V, p. 475.
Goya, Corrientes Province, E. Argentina.

Genus 41. EUNEOMYS, Coues

1874. Euneomys, Coues, Proc. Acad. Sci. Philadelphia, XXVI, p. 185.

Type Species.—*Reithrodon chinchilloides*, Waterhouse.

Range.—Central Argentine (Mendoza), and Patagonia, south to Cape Horn.

Number of Forms.—Four.

Characters.—Frontals extremely constricted; rostrum heavy; braincase relatively short; zygomata widely spreading. Zygomatic plate almost straight anteriorly, very slightly cut back, much simpler than in *Reithrodon*. Palate broader posteriorly than anteriorly; incisive foramina extending between front molars. A pair of well-marked depressions are situated each side in the posterior part of the palate. Bullae not large. Incisors broad, one-grooved. Upper cheekteeth of *Sigmodon* type; dentition heavy; the folds very narrow, but deep, as *Sigmodon*, not open as *Phyllotis*, part of which (subgenus *Auliscomys*) was referred to the present genus by Thomas, but appears to have little to do with it, differing clearly in the dental pattern as well as the less specialized posterior palate. Folds of molars very deep; two each side of M.1, alternating so that the front outer one nearly joins the second inner one; M.2 with a fold each side, S-shaped (simpler than *Reithrodon*); M.3 a small replica of M.2. Lower cheekteeth of same type as the upper molars, the enamel thick; M.3 S-shaped; M.2 nearly so, but with a small posterointernal fold; M.1 with two outer, three inner deep alternating folds, and a small anterior fold traceable.

Mammae 2—2=8. Ear not reduced. Fur extremely thick and soft in the type species; tail relatively short, fully haired; claws not enlarged. M.1 is evidently three-rooted.

This is not a common genus, and I have seen no specimens in which the teeth are cutting.

Forms seen: *chinchilloides*, *dabbeni*, *mordax*, *ultimus*.

List of Named Forms

1. EUNEOMYS CHINCHILLOIDES, Waterhouse

1839. Zool. Voy. Beagle, pt. 2, Mamm. p. 72.
N. Tierra del Fuego.
Synonym: *petersoni*, Allen, 1903, Bull. Amer. Mus. Nat. Hist. XIX, p. 192. Upper Rio Chico, Santa Cruz, S.-W. Patagonia.

2. EUNEOMYS DABBENI, Thomas

1919. Ann. Mag. Nat. Hist. 9, IV, p. 127.
Lago Viedma, Santa Cruz Territory, S. Patagonia.

3. EUNEOMYS MORDAX, Thomas

1912. Ann. Mag. Nat. Hist. 8, X, p. 410.
Fort San Rafael, Mendoza Province, W. Argentine.

4. EUNEOMYS ULTIMUS, Thomas

1916. Ann. Mag. Nat. Hist. 8, XVII, p. 185.
Hermite Island, St. Martin's Cove, Cape Horn.

Genus 42. CHELEMYSCUS, Thomas

1925. Chelemyscus, Thomas, Ann. Mag. Nat. Hist. 9, XV, p. 585.

Type Species.—*Reithrodon fossor*, Thomas.

Range.—North-west Argentina.

Number of Forms.—One.

CHARACTERS.—Skull, including the specialized posterior palate, essentially as in *Euneomys*. Upper incisors grooved. Zygomatic plate slightly cut back above. Cheekteeth as in *Euneomys*. Lower incisor root showing on mandible below condyle. Externally more specialized for fossorial life than in *Euneomys*; ear very reduced; foreclaws extremely lengthened, about as in *Notiomys* (the claw of D.5 shorter than that of the three central digits); fur soft; tail short, fully haired.

Forms seen: *fossor*.

List of Named Forms

1. CHELEMYSCUS FOSSOR, Thomas
1899. Ann. Mag. Nat. Hist. 7, IV, p. 280.
Salta, N.-W. Argentina.

Genus 43. HOLOCHILUS, Brandt

1835. HOLOCHILUS, Brandt, Mém. Acad. Imp. Sci. St. Petersb. 6, I, p. 428.

TYPE SPECIES.—*Mus leucogaster*, Brandt.

RANGE.—South America; Venezuela, British Guiana, Brazil (Eastern), Peru, Paraguay, Uruguay, Argentina, Chile, Patagonia.

NUMBER OF FORMS.—Fourteen.

CHARACTERS.—Skull with supraorbital ridges usually developed, and extending (not heavily) over the parietals; interparietal well developed; frontals considerably constricted. Zygomatic plate sharply cut back above, a small forwardly projecting process on upper border can be present. Incisors plain, relatively broad. Jugal in some specimens seen abnormally reduced, the zygomatic arch almost complete without it. Bullae moderate. Incisive foramina well open, but usually not extending quite to toothrows. Palate reaching behind M.3, with lateral pits present. Coronoid process of mandible high, well developed.

Upper molars flatcrowned, prismatic, without cusps, but the folds not widely open. M. 1 with anterior loop, two alternating more or less closed triangles, and posterior loop, which is also usually composed of two more or less closed triangles; two folds each side of this tooth. M.2 like M.1 except that the antero-internal fold is suppressed; M.3 is enlarged, the anterior loop followed by a deep outer and inner fold, and then a long rounded portion, the elements of which become obliterated, but in which one outer fold is usually traceable. When cut, there are no traces of cusps, and the molars are practically flatcrowned; the pattern is more complex; M.3 has at least three outer re-entrant folds. The front loop of the adult in M.3 may be isolated. The pattern appears to be preserved for a long time. Lower teeth: the permanent folds are, in M.1 two outer, three inner; in M.2, one outer, two inner; M.3 is S-shaped, but not enlarged. The anterior lobe of M.1 usually with an isolated island present.

Form ratlike; rather large; tail subequal in length to head and body as a rule, and usually poorly haired, though in some forms, as *H. vulpinus*, the under side has a swimming-fringe. Hindfoot noticeably larger than forefoot, the three centre digits considerably longer than the outer two; hindclaws prominent, and toes may be partly webbed.

REMARKS.—If cranial and dental characters are to be relied on, this genus must be very closely allied to *Sigmodon*.

Forms seen: *balnearum*, *chacarius*, *darwini*, *guianae*, *nanus*, *sciureus*, *vulpinus*, *berbicensis* (*Holochilus sciureus berbicensis*, Morrison-Scott, 1937, from British Guiana).

LIST OF NAMED FORMS

1 HOLOCHILUS AMAZONICUS, Osgood

1915. Field. Mus. Nat. Hist. Publ. Zool. ser. X, no. 13, p. 188.
Itacoatiara, Rio Amazonas, Central Brazil.
(According to Gyldenstolpe, "most certainly identical with *H. sciureus*.")

2. HOLOCHILUS BALNEARUM, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 447.
Banado de San Felipe, Tucuman Province, N.-W. Argentine.

3. HOLOCHILUS CHACARIUS, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 446.
Concepcion, Chaco, Paraguay.

4 HOLOCHILUS DARWINI, Thomas

1897. Ann. Mag. Nat. Hist. 6, XIX, p. 496.
Bahia Blanca, Buenos Aires Province, S.-E. Argentine.
Synonym: *braziliensis*, Waterhouse, 1839, Zool. Voy. Beagle, Mamm. p. 58.

5. HOLOCHILUS GUIANAE, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 149.
Kanuku Mountains, British Guiana.

6. HOLOCHILUS INCARUM, Thomas

1920. Proc. U.S. Nat. Mus. LVIII, p. 226.
Santa Ana, Cuzco district, Central Peru.

7. HOLOCHILUS NANUS, Thomas

1897. Ann. Mag. Nat. Hist. 6, XIX, p. 495.
Source, Marajó Island, N.-E. Brazil.

8 HOLOCHILUS PHYSODES PHYSODES, Lichtenstein

1827. Lichtenstein in Brants; Het geslacht d. Muizen, p. 139.
São Paulo Province, S. Brazil.

9. HOLOCHILUS PHYSODES LEUCOGASTER, Brandt

1835. Mém. Acad. Imp. Sci. St. Petersb. VI, no. 1, p. 428.
Brazil.

10. HOLOCHILUS RUSSATUS, Wagner

1850. Abhandl. Akad. d. Wiss. in München, V, p. 312.
Ypanema, São Paulo Province, S. Brazil.

11. HOLOCHILUS SCIUREUS, Wagner

1842. Arch. für Naturg. VIII, 1, p. 17.
Rio San Francisco, E. Brazil.

12. HOLOCHILUS SIMPSONI, Philippi
1900. An. Mus. Nac. de Chile, 1, p. 29.
Santo Domingo Island, W. Patagonia.

13. HOLOCHILUS VENEZUELAE, Allen
1904. Bull. Amer. Mus. Nat. Hist. XX, p. 330.
El Llagual, Central Venezuela.

14. HOLOCHILUS VULPINUS, Lichtenstein
1827. In Brants, Het geslacht d. Muizen, p. 137.
Maldonado, Uruguay.

The form *lutescens*, Gay, 1849, Hist. Nat. Chili Zool., 1, p. 118, is probably based on a *Rattus* (*alexandrinus*) (Thomas, note in his copy of Gay).

Genus 44. SIGMODON, Say & Ord

1825. SIGMODON, Say & Ord, Journ. Acad. Nat. Sci. Philadelphia, vol. 4, pt. 2, p. 352.

TYPE SPECIES.—*Sigmodon hispidum*, Say & Ord.

RANGE.—From Southern United States (Florida, Texas, Arizona, New Mexico), through Mexico, including Yucatan, to Honduras, Guatemala, Costa Rica, Panama, and in South America from Venezuela Colombia, Ecuador, and Peru.

NUMBER OF FORMS.—Forty-seven.

CHARACTERS.—Skull with heavy rostrum, powerful supraorbital ridges which extend on to the parietals; interparietal broad; zygomatic plate very sharply cut back above, with forwardly projecting process on upper border; bullae moderate. Incisive foramina extending to toothrows. Palate broad, reaching behind M.3; lateral pits well developed; pterygoid fossae unusually deep; coronoid process on mandible well developed. Lower incisor root tends to show on mandible.

Upper cheekteeth heavy, flatcrowned, with long narrow folds; M.1 with two outer ones, placed posteriorly, and two inner ones, placed anteriorly, the folds surrounded by thick enamel, the second inner fold nearly meeting the first outer one. M.2 like M.1, but anterointernal fold absent. M.3 with first fold usually extending across tooth, and isolating the anterior loop; in the second lamina thus formed is a deep re-entrant outer fold. When cut the pattern is nearly identical; and it is traceable until old age. No tendency for the folds to isolate on crown surface, except the anteroexternal one in M.2.

Lower cheekteeth: two outer folds in M.1, and three inner ones. M.2 with one outer, two inner ones. M.3 with one fold each side, more or less S-shaped. With wear, M.2 also becomes S-shaped often, owing to the disappearance of the front inner fold. Incisors broad, plain.

Mammae 3—2 = 10. Fur short, harsh. Ear relatively small. Tail shorter than head and body, moderately or poorly haired; three centre digits of hindfoot considerably longer than the outer two; plantar pads 6. Form thickset.

A fossil species or closely allied genus is described from Eastern Asia.

Forms seen: *berlandieri*, *bogotensis*, *chiriquensis*, *colimae*, *hirsutus*, *hispidus*, *littoralis*, *lönnbergi*, *mascotensis*, *puna*, *simonsi*.

The forms occurring north of Panama were revised by Bailey, 1902, Proc. Biol. Soc. Washington, 15, p. 101; two groups were recognized:

hispidus group, naked-tailed; and
fulviventer group, hairy-tailed. The South American species are not revised.

List of Named Forms

(Nearctic forms (north of Panama); revised by Bailey, Proc. Biol. Soc. Washington, XV, p. 101, 1902.)

hispidus Group

1. SIGMODON HISPIDUS HISPIDUS, Say & Ord
1825. Journ. Acad. Nat. Sci. Philadelphia, IV, pt. 2, p. 354.
St. Johns River, Florida.

2. SIGMODON HISPIDUS LITTORALIS, Chapman
1889. Bull. Amer. Mus. Nat. Hist. II, p. 118.
East Peninsula, opposite Micco, Brevard County, Florida.

3. SIGMODON HISPIDUS SPADICIPYGUS, Bangs
1898. Proc. Boston Soc. Nat. Hist. XXVIII, p. 192.
Cape Sable, Monroe County, Florida.

4. SIGMODON HISPIDUS EXSPUTUS, G. M. Allen
1920. Journ. Mamm. Baltimore, 1, p. 236.
Big Pine Key, one of the southern Florida Keys, Monroe County, Florida.

5. SIGMODON HISPIDUS TEXIANUS, Audubon & Bachman
1853. Quadr. N. Amer. vol. 3, p. 229.
Brazos River, Texas.

6. SIGMODON HISPIDUS BERLANDIERI, Baird
1855. Proc. Acad. Nat. Sci. Philadelphia, VII, p. 333.
Rio Nazos, Coahuila, Mexico.
Synonym: *hispidus pallidus*, Mearns, 1897, Advance Sheet Proc. U.S. Nat. Mus. XX, p. 4. Left bank of Rio Grande, about 6 miles above El Paso, Texas.

7. SIGMODON HISPIDUS CONFINIS, Goldman
1918. Proc. Biol. Soc. Washington, XXXI, p. 21.
Safford, Graham County, Arizona.

8. SIGMODON HISPIDUS CIENEGAE, Howell
1919. Proc. Biol. Soc. Washington, XXXII, p. 161.
Bullock's Ranch, 4 miles east of Fort Lowell, Pima County, Arizona.

9. SIGMODON HISPIDUS EREMICUS, Mearns
1897. Advance Sheet Proc. U.S. Nat. Mus. XX, p. 4.
Cienega Well, 30 miles south of monument no. 204, Mexican boundary line, left bank of Colorado River, Sonora, Mexico.

10. SIGMODON HISPIDUS ARIZONAE, Mearns
1890. Bull. Amer. Mus. Nat. Hist. II, p. 287.
Fort Verde, Yavapai County, Arizona.

11. SIGMODON HISPIDUS MASCOTENSIS, Allen
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 54.
Mineral San Sebastian, Mascota, Jalisco, Mexico.
Synonym: *colimae*, Allen, 1897, Bull. Amer. Mus. Nat. Hist. IX, p. 55.
Plains of Colima, Mexico.

12. SIGMODON HISPIDUS TONALENSIS, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 109.
Tonala, Chiapas, Mexico.

13. SIGMODON HISPIDUS GRISEUS, Allen
1908. Bull. Amer. Mus. Nat. Hist. XXIV, p. 657.
Chontales, coast lowlands, Nicaragua.

14. SIGMODON HISPIDUS BAILEYI, Allen
1903. Bull. Amer. Mus. Nat. Hist. XIX, p. 601.
La Cienaga de las Vacas, N.-W. Durango, Mexico.

15. SIGMODON HISPIDUS MAJOR, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 109.
Sierra de Choix, 50 miles north-east of Choix, Sinaloa, Mexico.

16. SIGMODON HISPIDUS INEXORATUS, Elliot
1903. Field. Columb. Mus. Publ. 71, z.s. vol. 3, p. 144.
Ocotlan, Jalisco, Mexico.

17. SIGMODON HISPIDUS JACKSONI, Goldman
1918. Proc. Biol. Soc. Washington, XXXI, p. 22.
3 miles north of Fort Whipple, Yavapai County, Arizona.

18. SIGMODON HISPIDUS TOLTECUS, Saussure
1860. Rev. et Mag. Zool. z, XII, p. 98.
Mountains of Vera Cruz, Mexico.

19. SIGMODON HISPIDUS SATURATUS, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 111.
Teapa, Tabasco, Mexico.

20. SIGMODON HISPIDUS FURVUS, Bangs
1903. Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 158.
Ceiba, Honduras.
Synonym: *fervidus*, Lydekker, Zool. Record. vol. 40, 1903, Mammals, p. 34.

21. SIGMODON HISPIDUS MICRODON, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 111.
Puerto Morelos, Yucatan, Mexico.

22. SIGMODON HISPIDUS BORUCAE, Allen
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 40.
Boruca, Costa Rica.

23. SIGMODON HISPIDUS CHIRIQUENSIS, Allen
1904. Bull. Amer. Mus. Nat. Hist. XX, p. 68.
Boqueron, Chiriqui, Panama.

24. SIGMODON HISPIDUS PLENUS, Goldman
1928. Proc. Biol. Soc. Washington, XLI, p. 205.
Parker, Arizona.

25. SIGMODON AUSTERULUS, Bangs
1902. Bull. Mus. Comp. Zool. Harvard Coll. XXXIX, p. 32.
Volcan de Chiriqui, Panama.

26. SIGMODON VULCANI, Allen
1906. Bull. Amer. Mus. Nat. Hist. XXII, p. 247.
Volcan de Fuego, Jalisco, Mexico.

27. SIGMODON ALLENI, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 112.
San Sebastian, Mascota, Jalisco, Mexico.
(A synonym of *mascotensis* according to Allen, 1906.)

28. SIGMODON ZANJONENSIS, Goodwin
1932. Amer. Mus. Nov. no. 528, p. 1.
Zanjon, Guatemala.

fulviventer Group

29. SIGMODON GUERRERENSIS, Nelson & Goldman
1933. Proc. Biol. Soc. Washington, XLVI, p. 196.
Omilteme, Guerrero, Mexico.

30. SIGMODON FULVIVENTER, Allen
1889. Bull. Amer. Mus. Nat. Hist. II, p. 180.
Zacatecas, State of Zacatecas, Mexico.

31. SIGMODON MELANOTIS, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 114.
Patzcuaro, Michoacan, Mexico.

32. SIGMODON MINIMUS MINIMUS, Mearns
1894. Proc. U.S. Nat. Mus. XVII, p. 130.
Upper corner monument, Grant County, New Mexico.

33. SIGMODON MINIMUS GOLDMANI, Bailey
1913. Proc. Biol. Soc. Washington, XXVI, p. 132.
7 miles north of Palomas, Quay County, New Mexico.

34. SIGMODON OCHROGNATHUS, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 115.
Chisos Mountains, Brewster County, Texas.

35. SIGMODON LEUCOTIS, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 115.
Valparaiso Mountains, Zacatecas, Mexico.

36. SIGMODON ALTICOLA ALTICOLA, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 116.
Cerro San Felipe, Oaxaca, Mexico.

37. SIGMODON ALTICOLA AMOLES, Bailey
1902. Proc. Biol. Soc. Washington, XV, p. 116.
Pinal de Amoles, Queretaro, Mexico.

38. SIGMODON PLANIFRONS, Nelson & Goldman
1933. Proc. Biol. Soc. Washington, XLVI, p. 197.
Juquila, S.-W. Oaxaca, Mexico.

Neotropical forms (unrevised; species listed alphabetically).

39. SIGMODON BOGOTENSIS, Allen
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 121.
Quebrada Seco, Rio Magdalena, W. Colombia.

40. SIGMODON CHONENSIS, Allen
1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 479.
Chone, Manavi Province, W. Ecuador.

41. SIGMODON HIRSUTUS, Burmeister
1854. Sitz. Naturf. Gesellsch. Halle, p. 16.
Maracaibo, N.-W. Venezuela.

42. SIGMODON INOPINATUS, Anthony
1924. Amer. Mus. Nov. no. 114, p. 3.
Urbina, Mt. Chimborazo, Ecuador.

43. SIGMODON LÖNNBERGI, Thomas
1921. Ann. Mag. Nat. Hist. 9, VII, p. 448.
Quevedo, Rio Palenque, S.-W. Ecuador.

44. SIGMODON PERUANUS, Allen
1897. Bull. Amer. Mus. Nat. Hist. IX, p. 118.
Trujillo, Cajabamba district, N.-W. Peru.

45. SIGMODON PUNA, Allen
1903. Bull. Amer. Mus. Nat. Hist. XIX, p. 99.
Puna, Puna Island, W. Ecuador.

46. SIGMODON SANCTAEMARTAE, Bangs
1898. Proc. Biol. Soc. Washington, XII, p. 189.
Pueblo Viejo, Sierra Nevada de Santa Marta, N.-E. Colombia.

47. SIGMODON SIMONSI, Allen
1901. Bull. Amer. Mus. Nat. Hist. XIV, p. 40.
Eten, N.-W. Peru.

Genus 45. SIGMOMYS, Thomas

1901. Sigmomys, Thomas, Ann. Mag. Nat. Hist. 7, VIII, p. 150.

Type Species.—*Reithrodon alstoni*, Thomas.

Range.—British Guiana and Venezuela.

Number of Forms.—Three.

Characters.—Essentially like *Sigmodon*, but upper incisors one-grooved, and cheekteeth tending to become more shortened antero-posteriorly. Supraorbital ridges lighter. Mammae 3—2=10.

Forms seen: *alstoni*, *savannarum*, *venester*.

List of Named Forms

1. SIGMOMYS ALSTONI, Thomas
1880. Proc. Zool. Soc. London, p. 691.
Cumana district, N. Venezuela.

2. SIGMOMYS SAVANNARUM, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 150.
Base of Kanuku Mountains, British Guiana.

3. SIGMOMYS VENESTER, Thomas

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 412.
El Trompillo, Lake Valencia, N. Venezuela.

Genus 46. ANDINOMYS, Thomas

1902. ANDINOMYS, Thomas, Proc. Zool. Soc. London, 1, p. 116.

TYPE SPECIES.—*Andinomys edax*, Thomas.

RANGE.—Bolivia. (A new race is named, 1937, from Tucuman, Argentina.)

NUMBER OF FORMS (to 1936).—One.

CHARACTERS.—Skull of the same type as *Auliscomys*, with much interorbital constriction, and widely spreading zygomata. Braincase reduced; rostrum heavy, and nasals broad, expanded anteriorly. Zygomatic plate concave in front, and sharply cut back above. Toothrows slightly divergent posteriorly. Palatal foramina very long. Incisors broad. Cheekteeth strongly hypsodont, more prismatic than *Phyllotis*, flatcrowned when cut; M.3 moderate; M.1 originally with four deep alternating folds; M.2 with two outer, and one inner folds; M.3 with a fold each side; the folds deep, well open, persistent; but the pattern becoming simplified with age. Lower teeth complex; M.1 with three well-marked inner folds, and one fold in front of the tooth, also three outer folds, of which the centre one is deep, the outer two shallow. M.2 with two folds each side, the posteroexternal one shallow; M.3 in adult retains only the one outer fold. M.1 lower appears very complex and different from *Phyllotis* originally, but becomes considerably simplified with wear.

Form thickset; externally with no special peculiarities; tail not reduced, sometimes not fully haired; mammae 2—2=8; plantar pads evidently 6. In the young animals, the molars in this genus are about as prismatic as in *Neotoma*.

Forms seen: *edax*.

LIST OF NAMED FORMS

1. ANDINOMYS EDAX, Thomas

1902. Proc. Zool. Soc. London, 1, p. 116.
El Cabrado, between Potosi and Sucre, Central Bolivia.

Genus 47. NEOTOMODON, Merriam

1898. NEOTOMODON, Merriam, Proc. Biol. Soc. Washington, XII, p. 127.

TYPE SPECIES.—*Neotomodon alstoni*, Merriam.

RANGE.—Mexico: Michoacan, Puebla, Vera Cruz.

NUMBER OF FORMS.—Three.

REMARKS.—This genus is represented in London only by one skull with very much worn teeth, so that perhaps it would have been wiser if I had left it out; but for the sake of completeness I have included it, though its position in the key must be taken as provisional, and may be erroneous.

CHARACTERS.—Palate extending to just behind M.3 (compare *Neotoma* and allies). Bullae not large. Interparietal well developed. Incisive foramina extending between the toothrows. "Molars large, rooted, and very massive, with flat crowns and heavy enamel, as *Neotoma*; enamel loops open throughout; M.1 and M.2 essentially alike; each with three salient enamel loops and two deep re-entrant angles on the outer side, and two salient loops, one shallow re-entrant angle on the inner side, as in *Neotoma desertorum*, from which the teeth differ in having the loops more nearly transverse. . . . M.3 a cylindrical peg. Enamel pattern of lower molars in general like that of *Hodomys*, with differences in detail; M.1 and M.2 with three salient loops and two re-entrant angles each side, the middle loops of the two sides not opposite; M.2 with anterior loop on outer side narrow and followed by a shallow re-entrant angle; M.3 shaped much like a letter S" (Merriam).

Goldman states that *Neotomodon* differs from the "Neotominae" in having the molar crowns half tuberculate in early life, in the shortness of the re-entrant angles, which in quite young individuals do not reach the alveoli, as well as in the extension of palatal bridges to posterior plane of last molars.

Mammae 6 (Merriam). Plantar pads 6. Thick furred, rather small Rats with prominent ear and relatively well-haired long tail.

Forms seen: *alstoni*.

LIST OF NAMED FORMS

1. NEOTOMODON ALSTONI, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 128.
Nahuatzin, Michoacan, Mexico.

2. NEOTOMODON ORIZABAE, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 129.
Mt. Orizaba, Puebla, Mexico.

3. NEOTOMODON PEROTENSIS, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 129.
Cofre de Perote, Vera Cruz, Mexico.

Genus 48. NEOTOMA, Say & Ord

1825. NEOTOMA, Say & Ord, Journ. Acad. Sci. Philadelphia, 4, p. 2, p. 345.

1910. HOMODONTOMYS, Goldman, North Amer. Fauna, no. 31, p. 86. (*Neotoma fuscipes*, Baird.) Valid as a subgenus.

1843. TEONOMA, Gray, List. Spec. Mamm. Brit. Mus. p. 117. (*Myoxus drummondi*, Richardson.) Valid as a subgenus.

TYPE SPECIES.—*Mus floridana*, Ord.

RANGE.—North America: forms named from British Columbia and Alberta (subgenus *Teonoma* only); Washington, Oregon, Utah, Colorado, Nevada, Arizona, New Mexico, California, Lower California; Texas, Kansas, Oklahoma, Nebraska, South Dakota, Illinois, Louisiana, Georgia, Florida, Pennsylvania; most of Mexico, and south to Guatemala and Nicaragua.

NUMBER OF FORMS.—Ninety-six.

CHARACTERS.—Skull with great interorbital constriction, supraorbital ridges usually developed, but not prominent; interparietal broader but otherwise as in *Hodomys* (below); rostrum pointed. Zygomatic plate evidently rather variable, but slightly cut back above. Incisive foramina broad and long, extending to toothrows. Bullae relatively large, but may vary in size in the genus. Palate terminating about on a level with front portion of M.3. Coronoid process of mandible high. Cheekteeth flatcrowned, prismatic, and hypsodont, in appearance reminiscent of those of the Microtinae; M.1 with two outer, two inner folds, the anterointernal fold not deep, and sometimes may be suppressed, as in *lepida*; deepest in the *mexicana* group, and *pennsylvanica*. M.2 with two outer, one inner folds; M.3 with a similar pattern to M.2 as regards the folds, the inner fold weak, the middle transverse loop typically not divided. Outer fold originally deep, and dentine spaces sharp and angular; in M.2, the first outer fold nearly meets the inner one; the second outer fold is deep; on M.1, the second main inner fold meets or nearly meets the front outer one. The pattern becomes obliterated in old age. Lower cheekteeth: two outer folds in M.1 and M.2, one in M.3; three inner folds in M.1 (the anterointernal one can be absent); two inner folds in M.2, and one in M.3; the latter tooth is not S-shaped as in allied genera, but is formed by two straight transverse loops; the lobes formed by these folds in the lower molars are nearly straight. The outer folds, except of M.3, are usually shallow.

Form Ratlike; size large. Tail relatively long, well haired, but not bushy in the typical subgenus. D.5 of hindfoot relatively long.

HOMODONTOMYS is proposed as a subgenus for *N. fuscipes* group on account of the fact that the toothrow is only slightly narrower posteriorly than anteriorly, and M.3 is broader than typical *Neotoma*, the middle enamel loop being partially divided by deepening of the inner re-entrant fold, so that sometimes this tooth may be divided into four closed triangles. External characters as in *Neotoma*.

TEONOMA is used as a subgenus for the *cinerea* group, in which the tail is about as bushy as that of a Dormouse or Squirrel. The sole is hairy, but the pads are not suppressed nor concealed. The skull is rather more angular as a rule than in *Neotoma*, and the ridges are better developed. Bullae large; cheekteeth near *Neotoma* s.s., the anterointernal fold of M.1 deep.

The genus is fully revised by Goldman, North Amer. Fauna, No. 31, 1910. Typical *Neotoma* is divided into six groups by this author, typified respectively by *floridana*, *albigula*, *intermedia*, *mexicana*, *desertorum*, and *pennsylvanica*.

I have for reference purposes noted the chief characters of each group, based on Goldman's key. In the first two groups, M.1 has the anterointernal fold deep.

The *pennsylvanica* group contains a large species (hindfoot more than 40), differing from other members of the genus in cranial characters.

The *mexicana* group contains smaller forms, hindfoot 40 and less.

In the remainder of the typical subgenus, the first upper molar has the anterointernal fold shallow or absent.

The *desertorum* group contains small forms, total length less than 320 mm. The remainder with one exception have the total length more than 320.

The *floridana* group differs from those that remain in having the interpterygoid fossae wider, and the bullae relatively smaller.

The *albigula* group have the interpterygoid fossae narrower and the bullae relatively larger than the last; the rostrum is shorter and heavier than in the *intermedia* group which is said to have the rostrum long and more slender.

For full details see Goldman's revision.

Forms seen: *affinis, annectens, arenacea, bryanti, cinerea, drummondii, fallax, floridana, ferruginea, fuscipes, intermedia, lepida, macrotis, micropus, mexicana, occidentalis, pennsylvanica, sinaloae, streatori, tenuicauda.*

Range maps of some of the groups will be found in Anthony, Field Book North Amer. Mammals, 1928. It will be seen that *N. cinerea* extends north just into Yukon.

List of Named Forms

(Revised by Goldman, North Amer. Fauna, No. 31, 1910.)

Subgenus *Neotoma*, Say & Ord

floridana group

1. NEOTOMA FLORIDANA FLORIDANA, Ord
1818. Bull. Soc. Philom. Paris, p. 181.
St. Johns River, Florida, probably near Jacksonville, Duval County.

2. NEOTOMA FLORIDANA RUBIDA, Bangs
1898. Proc. Boston Soc. Nat. Hist. XXVIII, p. 185.
Gibson, Terrebonne Parish, Louisiana.

3. NEOTOMA FLORIDANA ILLINOENSIS, Howell
1910. Proc. Biol. Soc. Washington, XXII, p. 28.
Wolflake, Union County, Illinois.

4. NEOTOMA FLORIDANA BAILEYI, Merriam
1894. Proc. Biol. Soc. Washington, IX, p. 123.
Valentine, Cherry County, Nebraska.

5. NEOTOMA FLORIDANA CAMPESTRIS, Allen
1894. Bull. Amer. Mus. Nat. Hist. VI, p. 322.
Pendennis, Lane County, Kansas.

6. NEOTOMA FLORIDANA ATTWATERI, Mearns
1897. Proc. U.S. Nat. Mus. XIX, p. 721.
Lacey's Ranch, Turtle Creek, Kerr County, Texas.

7. NEOTOMA FLORIDANA HAEMATOREIA, Howell
1934. Proc. Nat. Sci. Acad. Philadelphia, LXXXVI, p. 403.
Summit of Blood Mountain, Lumpkin County, Georgia.

8. NEOTOMA MICROPUS MICROPUS, Baird

1855. Proc. Acad. Nat. Sci. Philadelphia, VII, p. 333.
Charco Escondido, Tamaulipas, Mexico.
Synonym: *surberi*, Elliot, 1899, Field Columb. Mus. publ. 37, zool. ser. vol. 1, p. 279. 3 miles west of Alva, Woods County, Oklahoma.

9. NEOTOMA MICROPUS CANESCENS, Allen

1891. Bull. Amer. Mus. Nat. Hist. III, p. 285.
North Beaver Creek, Beaver County, Oklahoma.

10. NEOTOMA MICROPUS LITTORALIS, Goldman

1905. Proc. Biol. Soc. Washington, XVIII, p. 31.
Alta Mira, Tamaulipas, Mexico.

11. NEOTOMA MICROPUS PLANICEPS, Goldman

1905. Proc. Biol. Soc. Washington, XVIII, p. 32.
Rio Verde, San Luis Potosi, Mexico.

12. NEOTOMA MICROPUS LEUCOPHAEA, Goldman

1933. Journ. Washington Acad. Sci. 23, p. 472.
White Sands, 10 miles west of Point of Sands, National Monument, Otero County, New Mexico.

albigula Group

13. NEOTOMA ALBIGULA ALBIGULA, Hartley

1894. Proc. Cal. Acad. Sci. ser. 2, IV, p. 157.
Vicinity of Fort Lowell, near Tucson, Pima County, Arizona.
Synonym: *intermedia angusticeps*, Merriam, 1894, Proc. Biol. Soc. Washington IX, p. 127. New Mexico.

14. NEOTOMA ALBIGULA MEARNSI, Goldman

1915. Proc. Biol. Soc. Washington, XXVIII, p. 135.
Tinajas Atlas, Gila Mountains, Yuma County, Arizona.

15. NEOTOMA ALBIGULA SHELDONI, Goldman

1915. Proc. Biol. Soc. Washington, XXVIII, p. 136.
Pinacate Mountains (Papago Tanks), Sonora, Mexico.

16. NEOTOMA ALBIGULA VENUSTA, True

1894. Proc. U.S. Nat. Mus. XVII, p. 354.
Carrizo Creek, Imperial County, California.
Synonym: *cumulator*, Mearns, 1898, Proc. U.S. Nat. Mus. XX, p. 503. Old Fort Yuma, Imperial County, California.
desertorum grandis, Elliot, 1903, Field Columb. Mus. Publ. Zool. 3, p. 247. Cameron Lake, Kern County, California.

17. NEOTOMA ALBIGULA WARRENI, Merriam

1908. Proc. Biol. Soc. Washington, XXI, p. 143.
Gaume's Ranch, Baca County (north-west corner), Colorado.

18. NEOTOMA ALBIGULA MELANURA, Merriam

1894. Proc. Biol. Soc. Washington, IX, p. 126.
Ortiz, Sonora, Mexico.

19. NEOTOMA ALBIGULA LEUCODON, Merriam

1894. Proc. Biol. Soc. Washington, IX, p. 120.
San Luis Potosi, State of San Luis Potosi, Mexico.

20. NEOTOMA ALBIGULA DURANGAE, Allen
1903. Bull. Amer. Mus. Nat. Hist. XIX, p. 602.
San Gabriel, N.-W. Durango, Mexico.

21. NEOTOMA ALBIGULA ZACATECAE, Goldman
1905. Proc. Biol. Soc. Washington, XVIII, p. 30.
Plateado, Zacatecas, Mexico.

22. NEOTOMA ALBIGULA SERI, Townsend
1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 125.
Tiburon Island, Gulf of California, Sonora, Mexico.

23. NEOTOMA ALBIGULA MELAS, Dice
1929. Occ. Pap. Mus. Zool. Univ. Mich. no. 203, p. 3.
Malpais lava beds, near Carrizozo, Lincoln County, New Mexico.

24. NEOTOMA ALBIGULA LAPLATAENSIS, Miller
1933. Proc. Colorado Mus. Nat. Hist. 12, no. 1, p. 2.
Near Bondad, La Plata County, Colorado.

25. NEOTOMA ALBIGULA BREVICAUDA, Durrant
1934. Journ. Mamm. Baltimore, 15, p. 65.
Castle Valley, about 15 miles north-east of Moab, Grand County, Utah.

26. NEOTOMA LATIFRONS, Merriam
1894. Proc. Biol. Soc. Washington, IX, p. 121.
Querendaro, Michoacan, Mexico.

27. NEOTOMA NELSONI, Goldman
1905. Proc. Biol. Soc. Washington, XVIII, p. 29.
Perote, Vera Cruz, Mexico.

28. NEOTOMA PALATINA, Goldman
1905. Proc. Biol. Soc. Washington, XVIII, p. 27.
Bolanos, Jalisco, Mexico.

29. NEOTOMA MONTEZUMAE, Goldman
1905. Proc. Biol. Soc. Washington, XVIII, p. 29.
Zimapan, Hidalgo, Mexico.

30. NEOTOMA VARIA, Burt
1932. Trans. S. Diego Nat. Hist. Soc. 7, p. 178.
Turners Island, Gulf of California, Sonora, Mexico.

intermedia Group

31. NEOTOMA INTERMEDIA INTERMEDIA, Rhoads
1894. Amer. Nat. XXVIII, p. 68.
Dulzura, San Diego County, California.
Synonym: *californica*, Price, 1894, Proc. Cal. Ac. Sci. ser. 2, IV, p. 154, pl. 11. Bear Valley, San Benito County, California.

32. NEOTOMA INTERMEDIA GILVA, Rhoads
1894. Amer. Nat. XXVIII, p. 69.
Banning, Riverside County, California.
Synonym: *desertorum sola*, Merriam, 1894, Proc. Biol. Soc. Washington, IX, p. 126. San Emigdio, Kern County, California.
bella felipensis, Elliot, 1903, Field. Columb. Mus. Publ. 79, Zool. ser. 3, p. 217. San Felipe, Lower California.

33. NEOTOMA INTERMEDIA PRETIOSA, Goldman

1909. Proc. Biol. Soc. Washington, XXII, p. 139.
Matancita, 50 miles north of Magdalena Bay, Lower California

34. NEOTOMA INTERMEDIA ARENACEA, Allen

1898. Bull. Amer. Mus. Nat. Hist. X, p. 150.
San José del Cabo, Lower California.

35. NEOTOMA INTERMEDIA VICINA, Goldman

1909. Proc. Biol. Soc. Washington, XXII, p. 140.
Espiritu Santo Island, Gulf of California, Lower California.

36. NEOTOMA INTERMEDIA PERPALLIDA, Goldman

1909. Proc. Biol. Soc. Washington, XXII, p. 139.
San José Island, Gulf of California, Lower California.

37. NEOTOMA INTERMEDIA DEVIA, Goldman

1927. Proc. Biol. Soc. Washington, XL, p. 205.
Tanner Tank, Painted Desert, Arizona.

38. NEOTOMA INTERMEDIA RAVIDA, Nelson & Goldman

1931. Proc. Biol. Soc. Washington, XLIV, p. 107.
Comondu, S. Lower California.

39. NEOTOMA INTERMEDIA NOTIA, Nelson & Goldman

1931. Proc. Biol. Soc. Washington, LXIV, p. 108.
La Laguna, Sierra de la Victoria, S. Lower California.

40. NEOTOMA INSULARIS, Townsend

1912. Bull. Amer. Mus. Nat. Hist. XXXI, p. 125.
Angel de la Guardia Island, Gulf of California, Lower California.

41. NEOTOMA ABBREVIATA, Goldman

1909. Proc. Biol. Soc. Washington, XXII, p. 140.
San Francisco Island, near southern end of San José Island, Gulf of California, Lower California.

42. NEOTOMA NUDICAUDA, Goldman

1905. Proc. Biol. Soc. Washington, XVIII, p. 28.
Carmen Island, Gulf of California, Lower California.

43. NEOTOMA BRYANTI, Merriam

1887. Amer. Nat. XXI, p. 191.
Cerros Island, Lower California.

44. NEOTOMA ANTHONYI, Allen

1898. Bull. Amer. Mus. Nat. Hist. X, p. 151.
Todos Santos Island, Lower California.

45. NEOTOMA MARTINENSIS, Goldman

1905. Proc. Biol. Soc. Washington, XVIII, p. 28.
San Martin Island, Lower California.

mexicana Group

46. NEOTOMA MEXICANA MEXICANA, Baird

1855. Proc. Acad. Nat. Sci. Philadelphia, VII, p. 333.
Mountains near Chihuahua, State of Chihuahua, Mexico.

47. NEOTOMA MEXICANA FALLAX, Merriam

1894. Proc. Biol. Soc. Washington, IX, p. 123.
Gold Hill, Boulder County, Colorado.

48. NEOTOMA MEXICANA PINETORUM, Merriam

1893. Proc. Biol. Soc. Washington, VIII, p. 111.
San Francisco Mountain, Coconino County, Arizona.

49. NEOTOMA MEXICANA BULLATA, Merriam

1894. Proc. Biol. Soc. Washington, IX, p. 122.
Santa Catalina Mountains, Pima County, Arizona.

50. NEOTOMA MEXICANA MADRENSIS, Goldman

1905. Proc. Biol. Soc. Washington, XVIII, p. 31.
Sierra Madra, near Guadelupe y Calvo, Chihuahua, Mexico.

51. NEOTOMA MEXICANA SINALOAE, Allen

1898. Bull. Amer. Mus. Nat. Hist. X, p. 149.
Tatemeles, Sinaloa, Mexico.

52. NEOTOMA MEXICANA INOPINATA, Goldman

1933. Journ. Washington Acad. Sci. 23, no. 10, p. 471.
Chuska Mountains, N.-W. New Mexico.

53. NEOTOMA NAVUS, Merriam

1903. Proc. Biol. Soc. Washington, XVI, p. 47.
Sierra Guadelupe, Coahuila, Mexico.

54. NEOTOMA TORQUATA, Ward

1891. Amer. Nat. XXV, p. 160.
Abandoned mine between Tetela del Volcan and Zacualpan, Morelos, Mexico.
Synonym: *fulviventer*, Merriam, Proc. Biol. Soc. Washington, IX, p. 121, 1894. Toluca Valley, State of Mexico.
orizabae, Merriam, 1894, Proc. Biol. Soc. Washington, IX, p. 122. Mt. Orizaba, Puebla, Mexico.

55. NEOTOMA DISTINCTA, Bangs

1903. Proc. Biol. Soc. Washington, XVI, p. 89.
Teocelo, near Jalapa, Vera Cruz, Mexico.

56. NEOTOMA TROPICALIS, Goldman

1904. Proc. Biol. Soc. Washington, XVII, p. 81.
Totontepec, Oaxaca, Mexico.

57. NEOTOMA PARVIDENS, Goldman

1904. Proc. Biol. Soc. Washington, XVII, p. 81.
Juquila, Oaxaca, Mexico.

58. NEOTOMA FERRUGINEA FERRUGINEA, Tomes

1861. Proc. Zool. Soc. London, p. 282.
Dueñas, Guatemala.

59. NEOTOMA FERRUGINEA CHAMULA, Goldman

1909. Proc. Biol. Soc. Washington, XXII, p. 141.
Mountains near San Cristobal, Chiapas, Mexico.

60. NEOTOMA FERRUGINEA SOLITARIA, Goldman

1905. Proc. Biol. Soc. Washington, XVIII, p. 31.
Nenton, Guatemala.

61. NEOTOMA FERRUGINEA ISTHMICA, Goldman

1904. Proc. Biol. Soc. Washington, XVII, p. 80.
Huilotepec, 8 miles south of Tehuantepec, Oaxaca, Mexico.

62. NEOTOMA FERRUGINEA PICTA, Goldman
1904. Proc. Biol. Soc. Washington, XVII, p. 79.
Mountains near Chilpancingo, Guerrero, Mexico.

63. NEOTOMA FERRUGINEA TENUICAUDA, Merriam
1892. Proc. Biol. Soc. Washington, VII, p. 169.
North slope of Sierra Nevada of Colima, State of Colima, Mexico.

64. NEOTOMA FERRUGINEA OCHRACEA, Goldman
1905. Proc. Biol. Soc. Washington, XVIII, p. 30.
Atemajac, near Guadalajara, Jalisco, Mexico.

65. NEOTOMA FERRUGINEA VULCANI, Sanborn
1935. Field Mus. Nat. Hist. Publ. Zool. ser. XX, p. 84.
Volcan Tajumulco, south slope, San Marcos, Guatemala.

66. NEOTOMA CHRYSOMELAS, Allen
1908. Bull. Amer. Mus. Nat. Hist. XXIV, p. 653.
Matagalpa, Nicaragua.

desertorum Group

67. NEOTOMA DESERTORUM, Merriam
1894. Proc. Biol. Soc. Washington, IX, p. 125.
Furnace Creek, Death Valley, Inyo County, California.
Synonym: *bella*, Bangs, 1899, Proc. New Engl. Zool. Club, 1, p. 66.
Palm Springs, Riverside County, California.
nevadensis, Taylor, 1910, Univ. Calif. Pub. Zool. V, p. 289.
Virgin Valley, Humboldt County, Nevada.

68. NEOTOMA LEPIDA LEPIDA, Thomas
1893. Ann. Mag. Nat. Hist. 6, XII, p. 235.
(?)Utah.

69. NEOTOMA LEPIDA STEPHENSI, Goldman
1905. Proc. Biol. Soc. Washington, XVIII, p. 32.
Hualpai Mountains, Mohave County, Arizona.

70. NEOTOMA LEPIDA MONSTRABILIS, Goldman
1932. Journ. Mamm. Baltimore, 13, p. 62.
Ryan, Kaibab National Forest, Coconino County, Arizona.

71. NEOTOMA LEPIDA MARCOSENSIS, Burt
1932. Trans. S. Diego Nat. Hist. Soc. 7, p. 179.
San Marcos Island, Gulf of California, Lower California.

72. NEOTOMA LEPIDA LATIROSTRA, Burt
1932. Trans. S. Diego Nat. Hist. Soc. 7, p. 180.
Danzante Island, Gulf of California, Lower California.

73. NEOTOMA LEPIDA EGRESSA, Orr
1934. Proc. Biol. Soc. Washington, XLVII, p. 109.
A mile east of El Rosario, Lower California.

74. NEOTOMA LEPIDA BENSONI, Blossom
1935. Occ. Pap. Mus. Zool. Univ. Mich. no. 315, p. 1.
Papajo Tanks, Pinacate Mountains, Sonora, Mexico.

75. NEOTOMA LEPIDA RELICTA, Goldman
1932. Journ. Mamm. Baltimore, 13, p. 66.
Keams Canyon, Navajo County, Arizona.

76. NEOTOMA LEPIDA FLAVA, Benson

1936. Occ. Pap. Mus. Zool. Univ. Mich. no. 317, p. 7.
Tinajas Atlas, Yuma County, Arizona.

77. NEOTOMA GOLDMANI, Merriam

1903. Proc. Biol. Soc. Washington, XVI, p. 48.
Saltillo, Coahuila, Mexico.

78. NEOTOMA AURIPILA, Blossom

1934. Occ. Pap. Mus. Zool. Univ. Mich. no. 273, p. 1.
Agua Dulce Mountains, 9 miles east of Papago Well, Pima County, Arizona.

pennsylvanica Group

79. NEOTOMA PENNSYLVANICA, Stone

1893. Proc. Acad. Nat. Sci. Philadelphia, p. 16.
South Mountain, Cumberland County, Pennsylvania.

Subgenus *Homodontomys*, Goldman

80. NEOTOMA BUNKERI, Burt

1932. Trans. S. Diego Nat. Hist. Soc. 7, p. 181.
Coronados Island, Gulf of California, Lower California.

81. NEOTOMA FUSCIPES FUSCIPES, Baird

1857. Mamm. N. America. p. 495.
Petaluma, Sonoma County, California.
Synonym: *monochroura*, Rhoads, 1894, Amer. Nat. XXVIII, p. 67. Grant's Pass, Josephine County, Oregon.
splendens, True, 1894, Proc. U.S. Nat. Mus. XVII, p. 353. Marin County, California.

82. NEOTOMA FUSCIPES STREATORI, Merriam

1894. Proc. Biol. Soc. Washington, IX, p. 124.
Carbondale, Amador County, California.

83. NEOTOMA FUSCIPES ANNECTENS, Elliot

1898. Field Columb. Mus. Publ. 27, zool. ser. vol. 1, p. 201.
Portala, San Mateo County, California.
Synonym: *fuscipes affinis*, Elliot, same reference, p. 202. Alum Rock Park, Santa Clara County, California.

84. NEOTOMA FUSCIPES SIMPLEX, True

1894. Diagnoses of some undescribed wood rats (genus *Neotoma*) in the National Museum, p. 2; Reprint: Proc. U.S. Nat. Mus. XVII, p. 354.
Old Fort Tejon, Tehachapi Mountains, Kern County, California.
Synonym: *fuscipes dispar*, Merriam, 1894, Proc. Biol. Soc. Washington, IX, p. 124. Lone Pine, Inyo County, California.

85. NEOTOMA FUSCIPES MOHAVENSIS, Elliot

1903. Field Columb. Mus. Publ. 87, z.s. vol. 3, p. 246.
Oro Grande, Mohave Desert, San Bernardino County, California.

86. NEOTOMA FUSCIPES MACROTIS, Thomas

1893. Ann. Mag. Nat. Hist. 6, XII, p. 234.
San Diego, San Diego County, California.
Synonym: *cnemophila*, Elliot, 1904, Field Columb. Mus. Publ. 90, z.s. vol. 3, p. 267. Lockwood Valley, Mt. Pinos, Ventura County, California.

87. NEOTOMA FUSCIPES MARTIRENSIS, Orr

1934. Proc. Biol. Soc. Washington, XLVII, p. 110.
Valladares, Sierra San Pedro Martir, Lower California.

Subgenus *Teonoma*, Gray

88. NEOTOMA CINEREA CINEREA, Ord

1815. Guthrie's Geogr. 2d. Amer. ed. vol. 2, p. 292.
Near Great Falls, Cascade County, California.
Synonym: *cinerea acraia*, Elliot, 1903, Field Columb. Mus. Publ. 87, Zool. ser. vol. 3, p. 247.

89. NEOTOMA CINEREA LUCIDA, Goldman

1917. Proc. Biol. Soc. Washington, XXX, p. 111.
Charleston Peak, Charleston Mountains, Clark County, Nevada.

90. NEOTOMA CINEREA DRUMMONDII, Richardson

1828. Zool Journ. vol. 3, p. 517.
Probably near Jasper House, Alberta, Canada.

91. NEOTOMA CINEREA SAXAMANS, Osgood

1900. North Amer. Fauna, no. 19, p. 33.
Bennett City, head of Lake Bennett, British Columbia, Canada.

92. NEOTOMA CINEREA OCCIDENTALIS, Baird

1855. Proc. Acad. Nat. Sci. Philadelphia, p. 335.
Shoalwater Bay, Pacific County, Washington.
Synonym: *columbiana*, Elliot, 1899, Field Columb. Mus. publ. 32, zool. ser. 1, p. 255. Ducks, British Columbia.

93. NEOTOMA CINEREA FUSCA, True

1894. Diagnoses, etc. (*vide* No. 84 *supra*), p. 2; Reprint: Proc. U.S. Nat. Mus. XVII, p. 354.
Fort Umpqua, Douglas County, Oregon.
Synonym: *apicalis*, Elliot, 1903, Field Columb. Mus. publ. 74, zool. ser. vol. 3, p. 160. Gardiner, Coos County, Oregon.

94. NEOTOMA CINEREA OROLESTES, Merriam

1894. Proc. Biol. Soc. Washington, IX, p. 128.
Saguache Valley, 20 miles west of Saguache, Saguache County, Colorado.
Synonym: *cinnamomea*, Allen, 1895, Bull. Amer. Mus. Nat. Hist. VII, p. 331. Kinney Ranch, Bitter Creek, Sweetwater County, Wyoming.
grangeri, Allen, 1894, Bull. Amer. Mus. Nat. Hist. VI, p. 324. Custer, S. Dakota.

95. NEOTOMA CINEREA ARIZONAE, Merriam

1893. Proc. Biol. Soc. Washington, VIII, p. 110.
Keam Canyon, Apache County, Arizona.

96. NEOTOMA CINEREA RUPICOLA, Allen

1894. Bull. Amer. Mus. Nat. Hist. VI, p. 323.
Corral Draw, Pine River Indian Reservation, south-eastern base of Black Hills, S. Dakota.

Genus 49. HODOMYS, Merriam

1894. HODOMYS, Merriam, Proc. Acad. Nat. Sci. Philadelphia, XLVI, p. 232.

TYPE SPECIES.—*Neotoma alleni*, Merriam.

RANGE.—Mexico (Puebla and Colima).

NUMBER OF FORMS.—Two.

CHARACTERS.—Skull with supraorbital ridges tending to extend over the parietals; interparietal in the small series seen abnormally long anteroposteriorly. Incisive foramina long, narrow, extending to toothrows. Bullae small. Palate as in *Neotoma*. Coronoid process of mandible high. M.1, M.2 four-rooted, M.3 three-rooted (Merriam). Cheekteeth in general like those of *Neotoma*, but second inner fold of M.1 and inner fold of M.2 extending much further across the tooth; and M.3 lower S-shaped.

Size relatively large; feet as in *Neotoma*; tail moderately haired.

Merriam states, "Only two species of *Hodomys* are known. Both make extensive inosculating runways among the agaves and other plants on the brushy sidehills where they live. This habit is unknown in the allied genera, *Neotoma* and *Xenomys*. *Neotoma* builds houses or amasses large piles of sticks, cactus spines, and other rubbish; *Xenomys* lives in hollow trees. *Hodomys* is not known to do either."

Forms seen: *alleni*.

LIST OF NAMED FORMS

1. HODOMYS ALLENI, Merriam
1892. Proc. Biol. Soc. Washington, VII, p. 168.
Manzanillo, Colima, Mexico.

2. HODOMYS VETULUS, Merriam
1894. Proc. Acad. Nat. Sci. Philadelphia, XLVI, p. 236.
Tehuacan, Puebla, Mexico.

The allied genus *Xenomys*, not represented in London, will be noticed at the end of the subfamily. Here it may be stated that the *Neotoma* series of genera were referred to a subfamily Neotominae by Merriam (*Nelsonia*, *Neotoma*, *Teanopus*, *Hodomys*, *Xenomys*); this was referred to the Cricetinae by Miller & Gidley in their classification of the Order. The genera of the *Neotoma* series seem no more distinct from the main stem of Neotropical Cricetinae than do such forms as *Sigmodon*, *Holochilus*, *Neotomys*, and *Reithrodon*, on dental characters; and prismatic teeth of a similar type to those of *Neotoma* are found in the Neotropical *Andinomys*, and are suggested in *Chinchillula* and *Irenomys*. These were not compared by Merriam with his "Neotominae." Dentally *Andinomys* seems to lead straight into the *Neotoma* branch. Probably *Phyllotis* may be regarded as the starting-point both for the *Neotoma-Andinomys* section of the subfamily, and for the *Sigmodon-Reithrodon* section; or if not, then something which has or had a dental pattern like that of *Phyllotis*.

Genus 50. NELSONIA, Merriam

1897. NELSONIA, Merriam, Proc. Biol. Soc. Washington, XI, p. 277.

TYPE SPECIES.—*Nelsonia neotomodon*, Merriam.

RANGE.—Mexico (Michoacan and Zacatecas).

Number of Forms.—Two.

Characters.—Skull rather flat; zygomatic plate straight anteriorly; bullae prominent. Palate as in *Neotoma*. (Only one skull seen.) Cheekteeth flatcrowned, prismatic; M.1 and M.2 as in *Neotoma*, but the folds in the one specimen examined seem to be less well open; M.3 very simplified, differing from all Neotomine genera; with one anteriorly placed outer fold which nearly extends across the tooth, the rest of the tooth simple, without folds. The tooth is little reduced. M.2 is about as large as M.1. M.1 possesses only one inner fold.

Lower molars: M.1 with two outer, three inner folds, the anteroexternal and posterointernal ones much reduced. M.2 with one main outer fold, and a very small posterointernal fold; also one main inner one. M.3 with an inner fold, and a slight constriction on the outer side.

Size apparently much smaller than *Hodomys* or *Neotoma*; fur soft; ear prominent; tail long, well haired, tufted terminally; feet not abnormal.

Forms seen: *neotomodon*.

List of Named Forms

1. NELSONIA GOLDMANI, Merriam

1903. Proc. Biol. Soc. Washington, XVI, p. 80.
Mt. Tancitaro, Michoacan, Mexico.

2. NELSONIA NEOTOMODON, Merriam

1897. Proc. Biol. Soc. Washington, XI, p. 278.
Mountains near Plateado, Zacatecas, Mexico.

Genus 51. HYPOGEOMYS, Grandidier

1869. Hypogeomys, Grandidier, Rev. et Mag. Zool. XXI, p. 338.

Type Species.—*Hypogeomys antimena*, Grandidier.

Range.—Madagascar.

Number of Forms.—One.

Characters.—Skull very large, but not much ridged; rostrum prominent; interparietal large; occipital region upstanding and strong, ridged centrally. Paroccipital process thick and long, bullae very large. Incisive foramina excessively large and long, broadest in the middle, extending from the back of the incisors to the middle of M.1. Zygomatic plate broad but low; infraorbital foramen very large above. Jugal thick and unusually long for a Murine Rodent; zygoma very heavy. Upper cheekteeth flatcrowned, with inner and outer re-entrant folds, more or less prismatic in appearance; the folds strongly curved, the outer ones curving backwards. M.3 smaller than M.2, which is about equal to M.1. Two outer, and one inner folds in all teeth; the anteroexternal one of M.2 reduced, this fold in all teeth nearly meeting the inner fold. Cheekteeth strongly hypsodont. Perhaps the nearest approach to this dentition is *Neotoma*, but the folds in *Hypogeomys* are rather less open, and the general effect is less Microtine. There is a wide difference between the types, and *Hypogeomys* seems to be a very isolated genus.

Lower molars almost a series of transverse plates; M.1 with two outer, two inner folds, and three laminae, each of which are just joined by a narrow bridge. M.2 with three laminae, the front one completely separated; the two posterior ones joining centrally. M.3 more or less S-shaped, the folds nearly extending across the tooth.

These notes are based on one skull only.

Size very large, probably the largest member of the subfamily, though not comparing with some Oriental Murinae in this respect. Tail relatively long, scaly, moderately haired. Forefoot normal, with vestigial pollex, and the five pads normally developed. Hindfoot relatively long, with four digital pads well developed, but behind these the sole is naked to the heel, the normal pair of plantar pads evidently suppressed (a vestige of one may be traced, behind the hallux). Claws of hindfoot powerful, and outer digits not appreciably reduced. Ear large, and very simple within. (Notes based on one adult spirit specimen.)

Some fossil species of this genus have been described from Madagascar comparatively recently. The genus *Macrotarsomys*, which might belong here but is not represented in London, is noticed at the end of the subfamily.

Forms seen: *antimena*.

List of Named Forms

1. HYPOGEOMYS ANTIMENA, Grandidier

1869. Rev. et Mag. Zool. XXI, p. 339.

Banks of the Tsidsibon and the Andranoumène, Menabé, W. Madagascar.

The Fishing-Rats

(*Ichthyomys* Section)

Only three out of five named genera are represented in London. The others are *Daptomys* and *Neusticomys*.

Genus 52. ICHTHYOMYS, Thomas

1893. Ichthyomys, Thomas, Proc. Zool. Soc. London, p. 337.

Type Species.—*Ichthyomys stolzmanni*, Thomas.

Range.—South America: Peru, Ecuador, Colombia, and Venezuela.

Number of Forms.—Seven.

Characters.—Skull and form extremely modified for aquatic life. Skull bearing considerable resemblance to that of the Australian *Hydromys*. Nasals shortened anteriorly; whole skull flattened; braincase long and wide, interorbital constriction tending to become extreme. Interparietal may be vestigial or moderately developed. Infraorbital foramen very large; zygomatic plate extremely narrow, but well tilted upwards, just as in *Hydromys*.

Zygomata threadlike. Bullae small. Palate continued considerably behind last molars as a rule. Incisive foramina long, nearly to M.1. Mandible with large coronoid process. Upper incisors broad, their cutting edges worn to the shape of an inverted V. Lower incisors rather compressed, but not abnormally so. Upper cheekteeth simple, the cusps strictly opposite to each other, the depressions between them wide and prominent; six cusps in M.1, four in M.2, the folds separating them opposite, and weak; M.3 reduced. M.1 evidently three-rooted. Lower molars: M.3 bilaminate, in two clear portions; M.2 with four cusps, and two opposite re-entrant folds; M.1 with six cusps and four opposite folds, the two anterior cusps very narrow and close together. The depressions between the cusps conspicuous.

Fur thick, though less soft than in allied genera here noticed. Hindfoot large, broad, with well-developed swimming-fringe, the toes partly webbed; forefoot very small. Tail long, completely haired. All digits including hallux well developed on hindfoot. Mammae 1—2—6 (Thomas). Caecum much reduced (Thomas). Plantar pads five.

Forms seen: *caurinus*, *hydrobates*, *nicefori*, *orientalis*, *stolzmanni*, *söderströmi*.

List of Named Forms

1. ICHTHYOMYS CAURINUS, Thomas

1924. Ann. Mag. Nat. Hist. 9, XIII, p. 541.
Gualea, W. Ecuador.

2. ICHTHYOMYS HYDROBATES, Winge

1891. Vid. Meddel. Naturh. Foren. Kjobenhavn, p. 20.
Sierra de Merida, W. Venezuela.

3. ICHTHYOMYS NICEFORI, Thomas

1924. Ann. Mag. Nat. Hist. 9, XIII, p. 165.
Paima, Bogota region, Central Colombia.

4. ICHTHYOMYS ORIENTALIS, Anthony

1923. Amer. Mus. Nov. no. 55, p. 7.
Rio Napo, E. Ecuador.

5. ICHYTHOMYS SÖDERSTRÖMI, de Winton

1896. Proc. Zool. Soc. London, p. 512.
Rio Machangara, W. Ecuador.

6. ICHTHYOMYS STOLZMANNI, Thomas

1893. Proc. Zool. Soc. London, p. 339.
Central Peru, Chanchamayo.

7. ICHTHYOMYS TWEEDII, Anthony

1921. Amer. Mus. Nov. no. 20, p. 1.
Portovelo, Provincia del Oro, S.-W. Ecuador.

Genus 53. RHEOMYS, Thomas

1906. Rheomys, Thomas, Ann. Mag. Nat. Hist. 7, XVII, p. 421.

Type Species.—*Rheomys underwoodi*, Thomas.

Range.—Colombia, Panama, Costa Rica, El Salvador.

Number of Forms.—Five.

Characters.—(These notes based on one skull, type of *underwoodi*, and two skins, type of *underwoodi* and *trichotis*). Like *Ichthyomys* externally; fur rather softer, ear much reduced, as in *Ichthyomys*, but not vestigial. Skull with less interorbital constriction than *Ichthyomys* perhaps; upper incisors much narrower, their cutting edges normal; lower incisors much compressed, though evidently not so abnormal as *Anotomys*.

Remarks.—Perhaps not more than a subgenus of *Ichthyomys*.

Forms seen: *trichotis*, *underwoodi*.

List of Named Forms

1. RHEOMYS RAPTOR, Goldman

1912. Smiths. Misc. Coll. LX, no. 2, p. 7.
Near head of Rio Limon, Mt. Pirri, E. Panama.

2. RHEOMYS STIRTONI, Dickey

1928. Proc. Biol. Soc. Washington, XLI, p. 12.
Los Esemiles, Dept. Chalatenango, El Salvador.

3. RHEOMYS THOMASI, Dickey

1928. Proc. Biol. Soc. Washington, XLI, p. 11.
Mt. Cacaguatique, Dept. San Miguel, El Salvador.

4. RHEOMYS TRICHOTIS, Thomas

1897. Ann. Mag. Nat. Hist. 6, XX, p. 220.
Near Rio Magdalena, Cundinamarca district, W. Colombia.

5. RHEOMYS UNDERWOODI, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 422.
Tres Rios, Costa Rica.

Genus 54. ANOTOMYS, Thomas

1906. Anotomys, Thomas, Ann. Mag. Nat. Hist. 7, XVII, p. 86.

Type Species.—*Anotomys leander*, Thomas.

Range.—Known only from Western Ecuador.

Number of Forms.—One.

Characters.—(One skull seen only.) Skull of *Ichthyomys* type, but braincase more inflated and heavier; interorbital constriction extreme; nasals slanting upwards anteriorly, their opening in front very high, the nasals nearly projecting over the incisors; upper incisor root showing rather prominently on side of rostrum in front of infraorbital foramen. Lower incisors extremely compressed, but the upper ones evidently not so. In this character the genus approaches the highly aberrant Murine *Anisomys*, but the result is very different as in *Anotomys* the lower incisors are in no way deepened, whereas in *Anisomys* they are extremely deepened.

Ear vestigial, lacking functional ear conch. Tail longer than head and body;

fur very soft; hindfoot much larger than forefoot, as in *Ichthyomys*; proportions of digits about as *Ichthyomys*.

Forms seen: *leander*.

List of Named Forms

1. ANOTOMYS LEANDER, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 87.
Mt. Pichincha, W. Ecuador.

Genera Unrepresented in the British Museum

Eight named genera of Cricetinae are not represented in the British Museum. The most important of these is *Xenomys*, a member of the *Neotoma* section.

Genus 1. XENOMYS, Merriam

1892. Proc. Biol. Soc. Washington, VII, p. 160.

Type Species (and sole named form).—*Xenomys nelsoni*, Merriam. 1892. Proc. Biol. Soc. Washington, VII, p. 161. Hacienda Magdalena, between the city of Colima and Manzanillo, Colima, Mexico.

Characters (compiled from original description)—"With a skull much like that of *Neotoma mexicana*, it has well developed supra-orbital beads, like *Nyctomys*, large lachrymals, a large interparietal, and large and greatly inflated audital bullae." "In dentition it combines the three-rooted upper molars of true Murines with the non-tubercular prismatic grinding crowns of the Arvicolines and has broadly rounded alternating triangles of *Phenacomys*, only even more crowded." "The anterior border of the squamosal above the zygomatic process is marked by a projecting vertical ridge corresponding to the postorbital process of *Cuniculus* (= *Dicrostonyx*), *Myodes* (= *Lemmus*), and *Phenacomys*." "Paroccipital processes are long and stout." "Molar series large and heavy, much broader than *Neotoma*, or *Arvicola*; crowns flat, prismatic, non-tubercular, with broadly rounded and crowded alternating triangles as in *Phenacomys* and *Arvicola* . . . and bearing no resemblance to the narrow transversely elongated loops of *Neotoma*." The third lower molar is described as S-shaped.

2. TEANOPUS, Merriam

1903. Proc. Biol. Soc. Washington, XVI, p. 81.

Type.—*Teanopus phenax*, Merriam. Same reference. Camoa, Rio Mayo, Sonora, Mexico.

A member of the *Neotoma* section; bullae large and inflated, cf. *Xenomys*. Molars described as like *Neotoma albigula* group, but third lower molar as *Hodomys*.

3. NEUSTICOMYS, Anthony

1921. Amer. Mus. Nov. no. 20, p. 2.

Type.—*N. monticolus*, Anthony. Same reference. Nono, W. Ecuador.

A member of the *Ichthyomys* section. Described as less modified for aquatic life than *Ichthyomys* and *Anotomys*. The hallux greatly reduced.

4. DAPTOMYS, Anthony

1929. Amer. Mus. Nov. no. 383, p. 1.

TYPE.—*D. venezuelae*, Anthony. Same reference, p. 2. Neveri, Cumanacoa, N. Venezuela.

A member of the *Ichthyomys* section. Less modified for aquatic life than *Ichthyomys*.

5. PODOXYMYS, Anthony

1929. Amer. Mus. Nov. no. 383, p. 4.

TYPE.—*P. roraimae*, Anthony. Same reference. Mt. Roraima, British Guiana.

From description probably very closely allied to *Microxus*. Claws said to be long.

6. OTONYCTOMYS, Anthony

1932. Amer. Mus. Nov. no. 586, p. 1.

TYPE.—*Otonyctomys hatti*, Anthony. Same reference. Chichen Itza, Yucatan, Mexico.

Like *Nyctomys*, but with enormous bullae (as figured). Unless intermediate forms are discovered, this is probably to be regarded as a very distinct genus.

7. SCOLOMYS, Anthony

1924. Amer. Mus. Nov. no. 139, p. 1.

TYPE.—*Scolomys melanops*, Anthony. Same reference, p. 2. Mera, E. Ecuador.

From description evidently near *Neacomys*, and differing in cranial characters, such as very short rostrum, pro-odont incisors, shortened palatal foramina, etc. Fur spinous. Mammae 1—2 = 6. Molars very small.

8. MACROTARSOMYS, Milne-Edwards & Grandidier

1898. Bull. Mus. Paris, 4, p. 179.

TYPE.—*Macrotarsomys bastardi*, Milne-Edwards & Grandidier. Same reference. South of Mangoky, S.-W. Madagascar.

External form as figured very similar to *Hypogeomys*. Molars as figured evidently similar to *Hypogeomys*. Skull not mentioned in original description. But head and body only 90 mm. (*Hypogeomys* is a giant form.) Notwithstanding this, it is probable that *Macrotarsomys* stands nearest *Hypogeomys*.

The subfamily Cricetinae is known fossil according to Miller & Gidley from the Oligocene.

According to Gyldenstolpe, the following names (all described as belonging to the genus *Mus*(!), all from Chile, and all Ann. del Museo Nac. de Chile, 1900, pp. 5–70) cannot be identified. All of Philippi.

saltuum	Andes near Puerto Montt.
capito	Atacama.
tarsalis	Valdivia Prov.
megalotis	Santiago Prov.
psilurus	Colchagua Prov.
exiguus	Andes of Santiago.
chonoticus	Chonos Island.
commutatus	Valdivia.
melanizon	Chile.
melanotis	(?)
macronychos	Central Chile.
xanthopus	Osorno.
agilis	Illapel.
subrufus	Chile.
pencanus	Concepcion.
platytarsus	La Ligua.
pernix	La Pigua.
leptodactylus	Valparaiso.
glaphyrus	Maule Prov.
coquimbensis	Serena, Coquimbo Prov.
boedeckeri	Maule Prov.
osorninus	Osorno.
microtis	Maule Prov.
atratus	Maule Prov.
glirinus	Atacama.
lanatus	Atacama.
puerulus	Atacama.
cauquenensis	Quirihue, Maule Prov.
melaenus	Maule Prov.
foncki	Puerto Montt, Llanquihue Prov.
longibarbus	Valdivia Prov.
araucanus	Concepcion.
landbecki	Illapel.

Gyldenstolpe also lists the following names as unidentifiable:

porcinus, Philippi & Landb. Arch. f. Naturg. XXIV, 1, 1858, p. 78. Santiago Province.

concolor, Wagner, Arch. f. Naturg. XI, 1, 1845, p. 147. Rio Curicairi, Brazil.

brachyurus, Wagner, same reference. Ytarare, Brazil.

caniventris, Wagner, same reference, p. 148. Brazil.

canellinus, Wagner, 1843, Schreber's Säugeth. Suppl. iii, p. 552. Brazil.

brasiliensis, Desmarest, Nouv. Dict. Hist. Nat. xxix, 1819, p. 62. Brazil.

cephalotes, Desmarest, same reference, p. 63. St. Ignaz Guazu, Paraguay.
nigripes, Desmarest, same reference, p. 64. Paraguay.
brevicaudatus, Philippi, 1872, Zeitschr. Ges. Nat. vi, p. 446. Puerto Montt, Chile.
labiosus (*Scapteromys*), Winge, E. Museo Lundi, 1, iii, 1888, p. 39. Lagoa Santa, Minas Geraes.
modestus, Ribeiro (*Scapteromys*), 1914, Comm. Linhas. Telegr. de Matto Grosso, Zool. Annex, 5, p. 39. Caceres, Matto Grosso.
cinnamomeus, Pictet, 1841, Anim. Nouv. Mus. Genève, p. 64.
maculipes, Pictet, same reference, p. 67.
longitarsus, Rengger, Nat. d. Säugeth. Paraguay, 1830, p. 232. North of Villa Real, Paraguay.

CRICETINAE:

SPECIAL WORKS OF REFERENCE

Gyldenstolpe, A Manual of Neotropical Sigmodont Rodents, 1932, Kungl. Svenska Vetensk.-Akad. Handl. 3, Bd. II, no. 3.
Tate, Taxonomy of Neotropical genera, 1932. Amer. Mus. Nov. nos. 529, 541, 562, 579, 580, 581, 582, 583.
Goldman, North Amer. Fauna, 43, 1918. Revision of forms of *Oryzomys* occurring north of Panama.
Howell, 1914, North Amer. Fauna, no. 36. Revision of *Reithrodontomys*.
Osgood, North Amer. Fauna, no. 28, 1909. Revision of *Peromyscus* and *Baiomys*.
Hollister, 1914, Proc. U.S. Nat. Mus. XLVII, p. 427. Revision of *Onychomys*.
Osgood, 1925, Field. Mus. Nat. Hist. 229, zool. ser. no. 9. Notes on the species of the genus *Notiomys*.
Argyropulo, 1933, Zeitschr. für Säugetierk. Bd. 8, Heft 3, p. 133. Revision of Palaearctic Cricetinae, *Cricetus*, *Mesocricetus*, *Cricetulus*, *Phodopus*, *Calomyscus*.
Bailey, 1902. Proc. Biol. Soc. Washington, XV, p. 101. Revision of N. American *Sigmodon*.
Goldman, North Amer. Fauna, 1910, no. 31. Revision of *Neotoma*.
Merriam, Proc. Nat. Sci. Philadelphia, 1894, p. 225. Subfamily Neotominae.
Miller, Cat. Mamm. West Europe, 1912, p. 592. *Cricetulus*, *Cricetus*, and *Mesocricetus*.

Subfamily GYMNUROMYINAE

(New)

1896. Thomas: Sigmodontinae, part.
1899. Tullberg: Nesomyidae, part.
1918. Miller & Gidley: Cricetidae, Cricetinae, part.
1924. Winge: Muridae, Rhizomyini, part.
1928. Weber: Nesomyidae, part.

Geographical Distribution.—Madagascar.

Number of Genera.—One.

Characters.—Cheekteeth highly abnormal, and differing conspicuously in pattern from all other genera of Muridae examined. They are completely flatcrowned, laminate, with the laminae excessively tightly pressed together and compressed, much more so than in Murinae: all traces of cusps obliterated; M.3 slightly broader and longer than M.2, and M.2 slightly larger than M.1; the pattern a series of parallel isolated folds, these folds excessively narrowed and line-like. The laminae are much curved, and the dental pattern is in general complex. (Differing in this respect from laminate Murinae in which when the cusps are suppressed, the pattern becomes simplified). The folds separating the lamina not open at all (compare Cricetinae).

This dental pattern is probably derived from that of *Nesomys*, as it agrees with it in essential fundamental arrangement, but is so much more highly modified that I have come to the conclusion that *Gymnuromys* should have a special subfamily. In *Nesomys*, the folds are open, the cusps apparent, and the general pattern is not much more progressive than primitive *Oryzomys*-like Cricetinae, in which subfamily *Nesomys* has been retained.

It is of exceptional interest that the general dental pattern of *Gymnuromys* also agrees fundamentally, or so it seems to me, with the Dormouse *Platacanthomys*, differing indeed only in the fact that whereas in *Platacanthomys* the ridges are prominent, and the spaces between them deep, and well open at the outer side of the tooth (in the upper molars), in *Gymnuromys* the whole of the teeth have become tightly pressed together, with completely flat crowns, and the recurrent spaces closed. This supports the theory I have put forward in Vol. I that Muscardinidae cannot be regarded as very widely distinct from Muridae, and certainly are not to be considered as forming a distinct superfamily from them.

Genus 1. GYMNUROMYS, Forsyth Major

1896. Gymnuromys, Forsyth Major, Ann. Mag. Nat. Hist. 6, XVIII, p. 324.

Type Species.—*Gymnuromys roberti*, Forsyth Major.

Range.—Madagascar.

Number of Forms.—One.

Characters.—Skull with long rostrum, moderate interorbital constriction, infraorbital foramen well open; jugal long. Incisive foramina very short, far in front of toothrows. Bullae small. No supraorbital ridges. Cheekteeth completely flat; proportions of teeth as already described; the pattern a series of narrow straight and usually isolated line-like folds, such as are not seen elsewhere in the superfamily.

M.1 usually has five folds, the second extending right across the tooth, the third and fourth not completely isolated, or sometimes may be so; the first and fifth isolated, and small. M.2 has the same pattern, but often lacking the small front fold. M.3 with four main folds, and various small islands placed posteriorly. The anterior part of M.1 slopes rather abruptly inwards anteriorly, as in *Nesomys* (i.e. compared with a Cricetine type of tooth, the elements of the anterointernal cusp probably have been suppressed). Lower molars with a similar pattern to that of the upper teeth; M.1 with four folds as a rule, the second and fourth often not completely isolated; the third evidently originates from the inner side, the other ones from the outer side; M.2 similar to M.1; M.3 very large, with the same pattern, and also traces of one or two posterior folds.

Tail long, scaly, poorly haired. Feet rather broad, D.5 relatively long; form Ratlike, rather large (160 mm. or probably more).

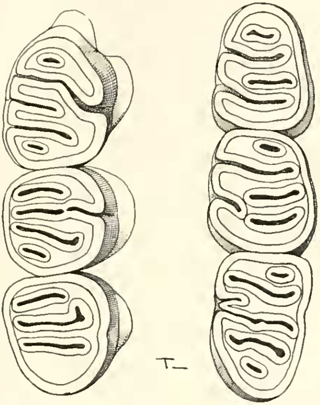

FIG. 29. GYMNUROMYS ROBERTI, Forsyth Major.
Cheekteeth: B.M. No. 97.9.1.142, ♀; × 12.

There is considerable individual variation in the exact pattern of the molars. In the type skull one side of the mouth has evidently been used more than the other, as the left-side pattern differs from that of the right.

Forms seen: *roberti*.

List of Named Forms

1. GYMNUROMYS ROBERTI, Forsyth Major

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 324.
Ampitambé Forest, N.-E. Betsileo, Madagascar.

Subfamily TACHYORYCTINAE

1896. Thomas: Spalacidae, Rhizomyinae, part; Muridae, Sigmodontinae, part.
1899. Tullberg: Spalacidae, part; Nesomyidae, part.
1918. Miller & Gidley: Rhizomyidae, part, Tachyoryctinae; Cricetidae, Cricetinae, part.
1924. Winge: Muridae, Rhizomyini, part.
1928. Weber: Spalacidae, part; Nesomyidae, part.

GEOGRAPHICAL DISTRIBUTION.—Eastern Africa, and Madagascar.

NUMBER OF GENERA.—In this subfamily I include two genera, *Brachyuromys* and *Tachyoryctes*.

CHARACTERS.—Cheekteeth hypsodont, $\frac{3}{3}$, with pattern reminiscent of that of the family Rhizomyidae, but more specialized, the adult pattern consisting of parallel curved thick cross-ridges of enamel on a more or less flat crown; the pattern changing slowly during adult life. Zygomasseteric structure apparently much less specialized than in Rhizomyidae, and not essentially different from normal Muridae.

REMARKS.—Forsyth Major many years ago drew attention to the similarity between the molars of *Tachyoryctes* and *Brachyuromys*, and stated that in his opinion, the family Spalacidae (consisting in those days of *Spalax*, *Rhizomys*, and *Tachyoryctes*) could be referred to the Muridae. Whether there is any close relationship between *Brachyuromys* and *Tachyoryctes*, or whether the dental similarity existing between the two genera has been derived independently is not clear; certain members of the subfamily Cricetinae, it should be noted, have a dental pattern consisting of more or less flatcrowned teeth with enamel islands isolating on crown surface in a manner reminiscent of the present group, but it seems that in none of these is the dental peculiarity carried to such an extreme point as in the two genera included here. *Brachyuromys betsileoensis* appears to have a less specialized dental pattern than either *Brachyuromys ramirohitra* or *Tachyoryctes*, and to be intermediate in some ways between these species and the less-specialized Cricetinae with flatcrowned molars. (I have elsewhere stated that the "Nesomyinae" containing all the Rats from Madagascar is an indefinable group.) By some authors, all the Madagascar Rats are referred to the Cricetinae; but *Eliurus* seems to have its affinities rather with the Murinae; *Brachytarsomys* appears to be a primitive Microtine; and *Brachyuromys* may, I think, be regarded as nearer to *Tachyoryctes* than to other Muridae, in spite of its generalized skull.

Tachyoryctes has usually been classed as a member of the Spalacidae, or more lately (Miller & Gidley) of the Rhizomyidae. The genus has none of the extreme fossorial specializations of *Spalax* (loss of eyes, tail; zygomatic plate turned downwards and infraorbital foramen enlarged; lambdoid slanting forward to posterior zygomatic root, etc.); and appears to be more advanced than *Spalax* in its dental pattern. It is needless to state that the old "family Spalacidae," containing all the Old World fossorial Rodents, and even at one time the Bathyergidae, is a most unnatural group. Nor has *Tachyoryctes* the extreme zygomasseteric peculiarities of the Rhizomyidae. Tullberg's figures of the masseteric insertion of *Tachyoryctes* beside the infraorbital foramen show clearly that there is nothing in this genus which is widely different from normal Muridae; whereas *Rhizomys* is very distinct not only from *Tachyoryctes* but from all other Muroid Rodents. A glance at the infraorbital foramen of *Tachyoryctes* compared with *Rhizomys* clearly indicates this fact. There seems no reason to regard the genus therefore as anything but a highly specialized member of the Muridae, with a dental pattern similar to that of *Brachyuromys* from Madagascar; also, according to Miller & Gidley, paralleling that of the fossil genus *Protechimys* (member of the Theridomyidae, Dipodoid or Anomaluroid Rodents).

The two genera here included in the Tachyoryctinae may each be regarded as type of a generic group.

Key to the Generic Groups of Tachyoryctinae

Skull fossorial; incisive foramina much reduced; mandible with prominent process formed by root of lower incisor; upper incisors pro-odont; palate much raised above general level of base of skull; infraorbital foramen with lower portion reduced; external form modified for subterranean life; jugal very long, often nearly extending to the lachrymal. Group Tachyoryctae (*Tachyoryctes*)

Skull not fossorial; incisive foramina very long; mandible with no process formed by lower incisor root; palate not much raised above general level of base of skull; upper incisors not pro-odont; infraorbital foramen with lower portion not reduced; external form generalized; jugal long, but not approaching lachrymal. Group Brachyuromyes (*Brachyuromys*)

The *Brachyuromys* Group (Brachyuromyes)

Essential characters as in Key above.

Genus 1. BRACHYUROMYS, Forsyth Major

1896. Brachyuromys, Forsyth Major, Ann. Mag. Nat. Hist. 6, XVIII, p. 322.

Type Species.—*Brachyuromys ramirohitra*, Forsyth Major.

Range.—Madagascar.

Number of Forms.—Two.

Characters.—Skull not fossorial. Frontals considerably constricted, supraorbital ridges not well marked. Interparietal large. Nasals slightly broadened anteriorly. Incisive foramina long, about to M.1. Palate slightly constricted anteriorly, much less raised and compressed than in *Tachyoryctes*. Bullae medium. Incisors rather broad. Jugal relatively long, though shorter than *Tachyoryctes*. Infraorbital foramen relatively large; zygomatic plate projecting forwards above, normal. Cheekteeth, of the type species, large, hypsodont; the pattern evidently long retained in the adult. The pattern is near that of *Tachyoryctes*, though a little less simplified; the teeth are rounded and flatcrowned; each tooth has two cross-ridges, slanting backwards from the outer side, and dividing the tooth into three parallel portions; the enamel on the main folds less thick than in *Tachyoryctes* as a rule. The teeth are roughly equal in size. M.3 tends to have a slight heel posteriorly, as in *Tachyoryctes*. Lower molars like those of *Tachyoryctes*, the ridges perhaps rather more oblique.

Brachyuromys betsileoensis appears to be a much more primitive form, which perhaps should be separated subgenerically, in which the Tachyoryctine dental pattern is not fully developed, or at least not so until extreme old age. The species was originally described as a *Nesomys*, but referred to the present genus by Forsyth Major. In the upper molars, the fold forming the anterior cross-ridge is separated in the middle in M.1 and M.2, the inner part isolated as a small island. M.3 is reduced in size, with the elements less clearly defined, and often isolated as three small enamel islands. The pattern may be described as that of two outer and one inner folds in M.1 and M.2. The lower teeth usually have one outer and two inner folds. M.3 is the smallest tooth.

Notwithstanding these differences, *B. betsileoensis* appears to stand nearer the typical *Brachyuromys* type of dentition than say to that of *Hypogeomys*, which probably approaches this type more closely than the other Muridae from Madagascar. The species is probably a forerunner of *B. ramirohitra*.

External form Ratlike. Fur thick and soft. Ear rather large; tail relatively short, moderately haired; feet not abnormal.

Forms seen: *betsileoensis*, *ramirohitra*.

List of Named Forms

ramirohitra Group

1. BRACHYUROMYS RAMIROHITRA, Forsyth Major

1896. Ann. Mag. Nat. Hist. 6, XVIII, p. 323.
Ampitambé Forest, on border of N.-E. Betsileo, Madagascar.

betsileoensis Group

2. BRACHYUROMYS BETSILEOENSIS, Bartlett

1879. Proc. Zool. Soc. London, p. 770.
S.-E. Betsileo, Madagascar.

The *Tachyoryctes* Group (Tachyoryctae)

Differing from *Brachyuromys* in a number of characters which have been already noted in the above Key, chiefly appertaining to specialization towards subfossorial life.

Genus 2. TACHYORYCTES, Rüppell

1835. Tachyoryctes, Rüppell, Neue Wirbelth. Fauna Abyssinien, Säugeth. p. 35.

Type Species.—*Bathyergus splendens*, Rüppell.

Range.—East Africa: Abyssinia, Somaliland, Kenya, Uganda, North Tanganyika, Eastern Congo.

Number of Forms.—About twenty-one are named.

Characters.—Skull with considerably constricted frontals; a sagittal ridge formed in the adult, behind the frontals and extending to the lambdoid crest. Occipital region prominent, but not very high, and little sloped forwards. Bullae relatively large. Rostrum thick; incisors very thick, pro-odont. Jugal very long for a Muroid, in some cases extending nearly to lachrymal. Palate much narrowed anteriorly, broad posteriorly, and with a prominent raised ridge running down the centre; pterygoid fossae deep; incisive foramina minute, situated considerably in front of anterior toothrows. Infraorbital foramen Murine in formation, wider above than below, quite well open, its lower portion reduced by fusion of zygomatic plate with side of rostrum, but V-shaped, as in normal specialized Muridae. Mandible with high recurved coronoid process (which is higher than the condylar), and very prominent process caused by root of lower incisor, between condylar and angular processes.

Cheekteeth extremely hypsodont, though not evergrowing, the upper molars curving backwards and outwards; pattern originally as follows: M.1 with a deep inner fold curving between two shallow outer folds (both of which wear out early); M.2 with a fold cutting across the tooth and dividing it into a narrow anterior and a wider posterior portion, the latter with an extra fold, which isolates and ultimately may wear out; M.3 like M.2, but tending with wear to become slightly larger. Each tooth in the adult has one very thick enamel ridge forming its anterior border, and another one parallel to it running across the centre of the tooth; the other elements, as indicated, are isolated or obliterated. The teeth are flatcrowned; M.1 is about equal to M.2 in size; M.3 slightly larger, with the posterior outer isolated fold forming a third thick enamel ridge, which is retained longer than the similar element in M.1 and M.2. The upper incisor root sometimes appears in the palate in front of M.1. Lower molars: M.1 divided almost into three lobes, the anterior one smallest, and just connected with the second; M.2 in two lobes, the anterior one with a deep inner fold; M.3 like M.2; this arrangement wears down to a pattern with four thick curved enamel ridges, which are oblique; the anterior and posterior respectively forming the terminations of the teeth; each tooth divided into three lobes by these ridges. The original folds appear to isolate less than those of the upper teeth.

Form Mole-like. Eyes and ears very small. Fur very thick and soft. D.3 the longest digit of the manus, slightly longer than D.2 which is a little longer than D.4; D.5 shorter than D.4; pollex rudimentary. Hindfoot with D.2 the main digit in all skins seen; D.3 and D.4 each successively a little shorter. Outer digits subequal and reduced. Claws not very large. Tail short, about twice the length of hindfoot, and well haired.

Forms seen: *audax*, *ankoliae*, *annectens*, *badius*, *cheesmani*, *daemon*, *ibeanus*, *macrocephalus*, *naivashae*, *ruddi*, *somalicus*, *spalacinus*, *splendens*, *storeyi*.

The genus is in much need of revision. All the named forms appear to me to be essentially similar, and possibly even only races of one species, except *macrocephalus*, a little-known form which differs from the others in its unusually large size.

List of Named Forms

(References and type localities the work of Mr. R. W. Hayman.)

macrocephalus Group

1. TACHYORYCTES MACROCEPHALUS MACROCEPHALUS, Rüppell

1842. Mus. Senckenberg, III, p. 97.
Shoa, S. Abyssinia.

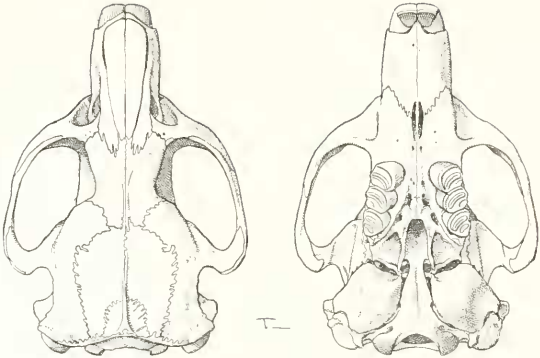

FIG. 30. TACHYORYCTES CHEESMANI CHEESMANI, Thomas.
B.M. No. 28.1.11.162, ♀; × $1\frac{1}{2}$.

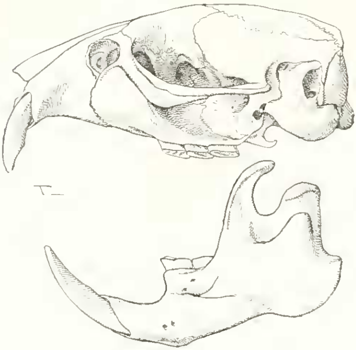

FIG. 31. TACHYORYCTES CHEESMANI CHEESMANI, Thomas.
B.M. No. 28.1.11.162, ♀; × $1\frac{1}{2}$.

2. TACHYORYCTES MACROCEPHALUS HECKI, Neumann & Rümmler
1928. Zeitschr. für Säugetierk. 3, p. 302.
Abakkara, 100 miles west of Lake Abassi, S. Abyssinia.

splendens Group

3. TACHYORYCTES SPLENDENS SPLENDENS, Rüppell
1835. Neue Wirbelt. Fauna Abyss. p. 36.
Gondar, Abyssinia.

4. TACHYORYCTES SPLENDENS SOMALICUS, Osgood
1910. Ann. Mag. Nat. Hist. 8, V, p. 276.
100 miles south-west of Berbera, Somaliland.

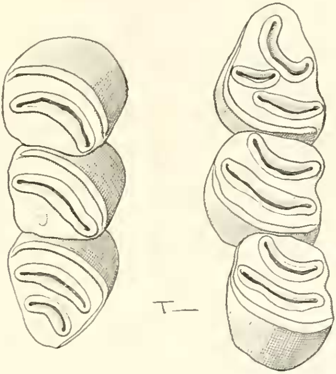

FIG. 32. TACHYORYCTES CHEESMANI CHEESMANI, Thomas.
Cheekteeth: B.M. No. 28.1.11.162, ♀; × 6.

5. TACHYORYCTES SPLENDENS OMOENSIS, Neumann & Rümmler
1928. Zeitschr. für Säugetierk. 3, p. 297.
Doko, S.-W. Abyssinia.

6. TACHYORYCTES SPLENDENS CANICAUDUS, Osgood
1936. Field. Mus. Nat. Hist. Publ. Zool. ser. XX, p. 232.
Sirre, Awash Valley, N. Arusi, Abyssinia.

7. TACHYORYCTES SPLENDENS IBEANUS, Thomas
1900. Proc. Zool. Soc. London, p. 179.
Machakos, Kenya.

8. TACHYORYCTES PONTIFEX, Neumann & Rummler
1928. Zeitschr. für Säugetierk. 3, p. 300.
Bufa, Kaffa, S. Abyssinia.

9. TACHYORYCTES CHEESMANI CHEESMANI, Thomas
1928. Ann. Mag. Nat. Hist. X, 1, p. 302.
Dangila, Abyssinia.

10. TACHYORYCTES CHEESMANI GALLARUM, Osgood
1936. Field. Mus. Nat. Hist. Publ. Zool. ser. XX, p. 233.
Mt. Albasso, N.-E. Chilalo Mountains, Arusi, Abyssinia.

11. TACHYORYCTES ANNECTENS, Thomas
1891. Ann. Mag. Nat. Hist. 6, VII, p. 304.
Mianzini, Masailand, Kenya.

12. TACHYORYCTES STOREYI, Thomas
1909. Ann. Mag. Nat. Hist. 8, IV, p. 547.
Lake Elmenteita, Kenya.

13. TACHYORYCTES NAIVASHAE, Thomas
1909. Ann. Mag. Nat. Hist. 8, IV, p. 547.
Lake Naivasha, Kenya.

14. TACHYORYCTES SPALACINUS, Thomas
1909. Ann. Mag. Nat. Hist. 8, IV, p. 547.
Embi, near Mt. Kenya.

15. TACHYORYCTES AUDAX, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 421.
Aberdare Mountains, Kenya.

16. TACHYORYCTES REX, Heller
1910. Smiths. Misc. Coll. LVI, no. 9, p. 4.
West slope of Mt. Kenya.

17. TACHYORYCTES RUDDI RUDDI, Thomas
1909. Ann. Mag. Nat. Hist. 8, IV, p. 546.
Kirui, Mt. Elgon, Kenya.

18. TACHYORYCTES RUDDI BADIUS, Thomas
1909. Ann. Mag. Nat. Hist. 8, IV, p. 546.
Eldoma Ravine, Kenya.

19. TACHYORYCTES ANKOLIAE, Thomas
1909. Ann. Mag. Nat. Hist. 8, IV, p. 545.
Burumba, Ankole, S.-W. Uganda.

20. TACHYORYCTES DAEMON, Thomas
1909. Ann. Mag. Nat. Hist. 8, IV, p. 545.
Mt. Kilimanjaro.

21. TACHYORYCTES RUANDAE, Lonnberg & Gyldenstolpe
1925. Arkiv. Zool. Bd. 17B, no. 5, p. 6.
Mt. Muhavura, Birunga Volcanoes, Kivu, E. Congo.

TACHYORYCTINAE: *SPECIAL WORKS OF REFERENCE*

Forsyth Major, 1897, Proc. Zool. Soc. London, p. 695, on the Malagasy Rodent Genus *Brachyuromys*.

Subfamily GERBILLINAE

1896. Thomas: Muridae, Gerbillinae.
1899. Tullberg: Family Gerbillidae.
1918. Miller & Gidley: Cricetidae, part, Gerbillinae.
1924. Winge: Muridae, Murini, part, Gerbilli.
1928. Weber: Muridae, Gerbillinae.

Geographical Distribution.—Throughout Africa in suitable localities, north and south of the Sahara, from Gambia to Somaliland, and from Morocco and Egypt to the Cape (not occurring in heavily forested west-central area). South-western Asia, from Arabia, Syria, Palestine, Asia Minor, Persia, Afghanistan, Peninsular India, Ceylon, and Russian Turkestan, west to the Caucasus and adjacent parts of South-east Russia, east to Chinese Turkestan, Mongolia, Shansi and Chihli.

Number of Genera.—Twelve are here retained.

Characters.—Skull characterized by tendency towards the form found in saltatorial Rodents (Dipodidae, Heteromyidae, etc.), with broadening of brain-case, great inflation of mastoids and auditory bullae in the majority, slender abruptly sloping zygoma, and weak narrow rostrum. Nasals usually projecting forwards over incisors. Zygomatic plate always cut back above, and sometimes projected forwards abnormally in front; infraorbital foramen often much narrowed, never large; a tendency present towards development or retention of a second pair of palatal foramina, between the toothrows (in some cases these as long as toothrows); mandible with small coronoid process (absent in one genus), high condylar process, and narrow angular portion, a wide curved space separating the condylar from the angular process behind; jaw relatively weak. Upper incisors normally grooved (plain in *Psammomys* and a few forms of *Tatera*).

Externally always modified for terrestrial plains or desert life; a tendency present for the limbs to be lengthened; tail normally fully haired (some genera or species are probably to a certain degree saltatorial; others are not so judging by specimens seen in Zoological Gardens).

Cheekteeth in progressive species extremely hypsodont, or in one genus, *Rhombomys*, evergrowing; in specialized forms the pattern consists of transverse plates separated by inner and outer folds (the folds deep and nearly meeting in median line of teeth); in primitive forms, the teeth as a rule not separated into plates, the folds weaker, and each lamina bearing clear traces of two cusps except the front one in M.1, which is single, in the upper molars. $M.\frac{3}{3}$ usually strongly reduced; the third lower molar is absent in one genus (*Desmodilliscus*).

It may be noted that Miller & Gidley refer the group to their "Cricetidae," rather than their Muridae, while Winge refers them to the "Murini" rather than "Cricetini." According to Tullberg the malleus and incus differ (in those he examined) from other groups of Muridae, the incus being larger. The group seems to be rather isolated among Muridae, and I can form no opinion as to whether it stands nearest Murinae or Cricetinae. It is considerably more specialized than either.

Too many genera are recognized at the present moment. Winge, 1924, in his classification, retained two only, *Gerbillus* and *Rhombomys*. The present currently accepted classification is based on that of Lataste, 1882, who keyed the groups roughly as follows (abbreviated):

"Lobes of molars, except the first and last, originally comprised each of two tubercles. Incisors always one-grooved. Genus GERBILLUS
- Occipital region . . . deeply surrounded by the bullae, which are enormous. . . . Tail club-shaped. Two carpal pads; sole hairy. Subgenus PACHYUROMYS
- Occipital region normal, the posterior surface plain or convex; bullae smaller. Tail sometimes thick, never massive.
  - One carpal pad; feet hairy. Subgenus GERBILLUS
  - Two carpal pads; feet naked.
    - No tarsal pads. Occipital vertical, as in *Meriones*. Subgenus TATERA
    - One or two tarsal pads. Occipital arched.
      - One tarsal pad; molar cusps opposite; bullae well developed and projecting beyond the occipital posteriorly. Subgenus HENDECAPLEURA
      - Two tarsal pads; molar cusps more or less alternating; bullae moderate, clearly passed by the occipital. Subgenus DIPODILLUS

Molars originally laminated, and with lobes more or less clearly lozenge-shaped. Grooves of upper incisor absent, single, or double. Genus MERIONES
- Incisors two-grooved. Subgenus RHOMBOMYS
- Incisors one-grooved.
  - No tarsal pads. Subgenus MERIONES
- Incisors plain.
  - One tarsal pad. Subgenus PSAMMOMYS"

All the above subgenera are currently given generic rank and have stood as full genera for many years with the exception of *Hendecapleura*, which was shown in 1895 by Thomas to be scarcely distinguishable from *Dipodillus*. With the great increase of named forms described since 1895 it is not always possible to say whether Lataste's characters of the feet are constant throughout the various groups. The most distinct of Lataste's "subgenera" are *Pachyuromys* and *Rhombomys* (the latter having rootless molars). *Desmodillus* was erected by Thomas & Schwann for a species referred by Lataste to *Gerbillus* s.s. Since Lataste's key, two very distinct genera, *Desmodilliscus* and *Ammodillus*, have been described, and a large number of names, some not even valid as subgenera, have been added to the list, as *Taterillus*, *Taterona*, *Taterina*, *Gerbilliscus*, *Pallasiomys*, *Brachiones*, *Microdillus*, *Cheliones*, and *Parameriones*. Of these three only *Brachiones*, *Microdillus*, and *Taterillus* (the last two rather doubtful), are here retained as genera; and *Dipodillus*, as fully noted below, is not regarded as a valid genus.

KEY TO THE GENERA OF GERBILLINAE

Mandible with no coronoid process. Toothrows converging posteriorly. AMMODILLUS

Mandible with at least a small coronoid process. Toothrows not or scarcely converging posteriorly.

- Cheekteeth not becoming extremely hypsodont, the pattern not consisting of deep re-entrant folds separating transverse plates, the general appearance of the molars less prismatic and more complex; the laminae when cut each bear clear traces of two tubercles in the upper molars (the foremost lamina is single, in M.1.).
  - Mastoids appearing prominently each side of and behind occiput when skull is viewed from above. Tail under 80 per cent of head and body length.
    - Third lower molar absent. (Second pair of palatal foramina much lengthened and widened; cheekpouches present.) DESMODILLISCUS
    - Third lower molar present.
      - Mastoids and bullae abnormally inflated, profoundly modifying the whole aspect of the skull. Tail strongly shortened, thickened, and club-shaped; second pair of palatal foramina widened. PACHYUROMYS
      - Mastoids and bullae less abnormally inflated. Tail less strongly shortened, not club-shaped. Second pair of palatal foramina not widened. DESMODILLUS
  - Mastoids and bullae not appearing prominently each side of and at back of occiput when skull is viewed from above. Third lower molar present. Tail never thickened and club-shaped.
    - Zygomatic plate not projected unusually far forwards anteriorly; occipital region weak; bullae moderately to well inflated; general form essentially normal for the group (Gerbil-like).
      - Tail shortened, not over 80 per cent head and body length. Frontals narrowed abruptly, not evenly divergent backwards. MICRODILLUS
      - Tail longer than head and body. Frontals more evenly divergent backwards. GERBILLUS
    - Zygomatic plate normally excessively projected forwards anteriorly; occipital region usually strong; bullae usually little inflated (for members of the present group); general form as a rule more Rat-like.
      - Second pair of palatal foramina much lengthened. TATERILLUS
      - Second pair of palatal foramina not much lengthened. TATERA

Cheekteeth becoming excessively hypsodont to evergrowing, the pattern consisting of deep approximately equal-sized re-entrant folds separating transverse plates, these plates showing no signs of the original tubercles even when cutting, the general appearance of the molars simpler, prismatic.

Cheekteeth evergrowing. RHOMBOMYS

Cheekteeth (so far as known) developing roots in adult.

Skull abnormal, in appearance almost triangular owing to extremely weak short rostrum, broadened frontals, and very wide braincase. BRACHIONES

Skull not more or less triangular in aspect; rostrum less reduced, and frontals more narrowed.

Upper incisors plain. Tail on average less than 80 per cent of head and body length. PSAMMOMYS

Upper incisors grooved. Tail on average more than 80 per cent of head and body length. MERIONES

Genus 1. GERBILLUS, Desmarest

1804. GERBILLUS, Desmarest, Nouv. Dict. Hist. Nat. XXIV, Tab. Méth. p. 22.
1881. DIPODILLUS, Lataste, Le Naturaliste, Paris, I, p. 506. (*Gerbillus simoni*, Lataste.) Valid as a subgenus.
1882. HENDECAPLEURA, Lataste, Le Naturaliste, Paris, II, p. 127. (*Gerbillus garamantis*, Lataste.)

TYPE SPECIES.—*Dipus gerbillus*, Olivier (*Gerbillus aegyptius*, Desmarest).

RANGE.—Sind, Baluchistan, Euphrates, Palestine, Syria, Sinai, Arabia south to Aden, across North Africa from Egypt to Morocco; Sudan, Somaliland, Kenya, Tanganyika, Abyssinia, Nigeria, South and South-west Africa.

NUMBER OF FORMS.—About seventy-seven.

This genus is currently divided into two genera, *Dipodillus* and *Gerbillus*, based on the hairiness or nakedness of the sole. In typical *Gerbillus*, there is said to be one carpal pad, and soles of hindfoot without pads; in *Dipodillus*, five carpal and six plantar pads. *Dipodillus* is a longstanding genus, with many named forms. Heptner, 1937, regards *Dipodillus* as a subgenus only of *Gerbillus*. I think he is correct in this classification, for three reasons:

1. The character noted above is not used in a full generic sense elsewhere in the Order, unless correlated with cranial and dental characters. (It is not possible to distinguish *Dipodillus* from *Gerbillus* on these characters.) For instance, the Sciurine genera *Sciurus* and *Citellus* may both have species which have on the one hand naked sole without reduction of plantar pads (cf. *Sciurus anomalus*), or hairy sole (cf. *Sciurus vulgaris*).

2. The intermediate forms *Gerbillus nancillus* and particularly *Gerbillus vallinus*. Some specimens of the latter appear to have soles that might either belong to *Dipodillus* or *Gerbillus*.

3. The lack of constancy of this character within the Gerbilline genus *Meriones*. Normal *Meriones* has furred soles, but in three groups, *persicus*, *rex*, and *calurus*, the soles are naked. *M. persicus* is referred to a subgenus *Parameriones* on this character, but given subgeneric rank only.

The alternative would be to retain *Dipodillus* and give *Parameriones* generic rank. But on account of the remarks above on intermediate forms and the character elsewhere in the Order, it is wiser provisionally to suppress *Dipodillus* as a full genus, in my opinion. Too many forms are named both for *Dipodillus* and *Gerbillus* for it to be possible to say whether the characters of the carpal and plantar pads given by Lataste and more lately Aharoni are valid throughout these genera or not.

CHARACTERS.—Skull with broadened braincase and narrow rather long rostrum; supraorbital ridges usually developed, though sometimes absent; in some forms, as *poecilops*, *acticola*, and *pyramidum*, becoming very prominent in adult. Zygoma narrow, rising abruptly anteriorly, the zygomatic plate heavy and thickened, well ridged, the general effect reminiscent of that of *Notomys*, but more extreme. Infraorbital foramen much narrowed. Upper incisors compressed, opisthodont, one-grooved. Palatal foramina long; a well-developed second pair present between the toothrows, which are not as long as the front pair. Bullae and mastoids well inflated, very much more so than in normal Murines, but not abnormally compared with some members of the present group. The size of the bullae varies in different species, but not to an abnormal degree. Basioccipital as a rule much narrowed. Paroccipital relatively well developed; occipital region weak. Zygomatic plate not abnormally projecting forwards (compare *Tatera*). Mandible as described above, in the characters of the subfamily. Upper cheekteeth: M.1 with three laminae, the front one narrower than the others, and in young specimens not bearing two cusps. All other laminae of upper cheekteeth bearing two cusps when unworn. In M.1 and M.2, the posterointernal cusp area is larger than the posteroexternal one. M.2 with two laminae, like the two posterior laminae of M.1 in appearance. M.3 as a rule single and simple, when cut usually with a minute posterior lamina behind the main one. This tooth reduced. The laminae are as a rule not pressed closely together. Even in well-worn teeth, traces of the original cusps are often present. Lower incisors plain; lower molars with three laminae in M.1, two in M.2, one in M.3; originally with traces at least in some laminae of cusps; the inner side of M.2 often tending to be enlarged and raised up. M.3 is very small.

Hindlimbs relatively long (some at least of the members of this genus are probably more or less saltatorial, as for instance a specimen of *G. gerbillus* in the London Zoological Gardens which appears to be so); hindfoot long, the sole in the typical subgenus hairy, though in *vallinus* part of the heel is naked, and the sole may be poorly haired. D.5 and the hallux both relatively long.

Forefoot hairy, the claws well developed. Ear large; fur very soft; tail well haired, longer than head and body, tufted terminally. Form light, and size not large; colour usually modified for life in desert. Mammae 8 (Shortridge: forms from South-west Africa).

In the subgenus Dipodillus, the hindfoot is, as already noted, naked; the forefoot is also naked below. *Hendecapleura* was erected by Lataste as a subgenus for a few forms in which there is one main tarsal pad instead of two (*Dipodillus* s.s.), and the bullae were said to be larger. Thomas in 1895 pointed out that this group was probably unretainable; many forms have subsequently been described with relatively large bullae; and it is not possible at the moment to say with certainty which forms would belong to which group on the character of the tarsal pads, as very many species are now named. The forms included in *Hendecapleura* by Lataste were *garamantis* and *nanus*, also *bottai* and *quadrimaculatus*; *famulus* was referred to it by Thomas.

Forms seen: *acticola*, *agag*, *allenbyi*, *amoenus*, *andersoni*, *arabium*, *arduus*, *brockmani*, *broomi*, *bonhotei*, *campestris*, *calidus*, *cheesmani*, *cinnamomeus*, *cosensi*, *dasyurus*, *diminutus*, *dodsoni*, *dunni*, *eatoni*, *famulus*, *floweri*, *garamantis*, *gerbillus*, *gleadowi*, *harwoodi*, *henleyi*, *hilda*, *hirtipes*, *indus*, *jordani*, *juliani*, *kalaharicus*, *lataslei*, *leucanthus*, *lixa*, *lowei*, *luteolus*, *luteus*, *mackilligini*, *mariae*, *mimulus*, *muriculus*, *nancillus*, *nanus*, *nigeriae*, *oralis*, *paeba*, *percivali*, *poecilops*, *principulus*, *pusillus*, *pyramidum*, "*pygargus*," *rosalinda*, *riggenbachi*, *rozsikae*, *ruberrimus*, *simoni*, *somalicus*, *stigmonyx*, *swalius*, *tarabuli*, *vallinus*, *vivax*, *watersi*.

This group is very difficult to classify, on account of the number of named forms which appear to be based on one specimen, and on account of the extremely small range (apparently) of some of the species.

The present arrangement must be regarded as an attempt to get some semblance of order out of considerable chaos; but it is very provisional, and no doubt most of the groups can be broken down.

Subgenus Dipodillus. (Range: Sind, Baluchistan, Kathiawar; Southern Arabia; Sinai, Palestine; across North Africa from Morocco and the Algerian Sahara (south to Asben), east to Egypt, the Sudan, Somaliland, Kenya, Tanganyika.)

Of the material examined, five groups appear to be distinguishable:

1. *campestris* group. Large forms; adult usually over or approaching 100 mm. head and body (up to 115). Bullae relatively small.

   With unusually heavy supraorbital ridges in the adult: *poecilops*, from Aden. (Tail shortest of group.)

   With more moderate supraorbital ridges in adult: *lowei*, from the Sudan; and *campestris* (with other named forms, *dodsoni*, etc., as races; Morocco to Asben and Tripoli).
2. *famulus* group. Containing one species, from Aden: head and body 92–100 in those seen; bullae larger than is normal; tail very heavily tufted terminally.
3. *garamantis* group. Moderate-sized forms (64–86 head and body length of those bearing measurements); bullae as in *famulus* group. Containing

nanus from Baluchistan and Sind, *garamantis* from Algeria and Arabia, and apparently *principulus* from the Sudan.

4. *dasyurus* group. Like the last, but bullae relatively smaller. Head and body 66–90, but usually in adult over 70. This group may not be retainable compared with the *garamantis* group. It contains the majority of the genus.

   G. vivax from Tripoli appears an unusually short-tailed form. Others referable to the group are *somalicus* (tail rather shorter), and *brockmani* (tail rather longer), from Somaliland; *stigmonyx*, *percivali*, and *watersi* (Sudan or Kenya); *harwoodi*, Kenya, with rather a shorter tail than the last three (on average); also *mimulus* from Arabia; *dasyurus* from Sinai, and *amoenus* from Egypt. Finally *mackilligani*, from Egypt, has a proportionately longer tail than any other species examined bearing measurements (166 per cent of head and body length).

5. *simoni* group. Pygmy forms, normally under 70 mm. head and body length (usually about 65).

   D. simoni, Algeria, appears to stand apart from other members of the group on account of its small bullae. Others are *henleyi* (tail shorter), and *mariae* (tail longer), from Egypt; *jordani* from Algeria; *muriculus* from the Sudan; *diminutus* from Kenya; and perhaps *juliani* from Somaliland.

   Many of these forms are very imperfectly known.

   I have seen too few of *lixa* (probably *simoni* group), *hilda*, and *ruberrimus* to be able to allocate them.

Subgenus Gerbillus. (Range: Sind, Palanpur; Lower Euphrates; Palestine, Arabia (Central), Sinai; North Africa from Morocco to Egypt, and south to Sahara, Nigeria, Sudan, Kenya, Abyssinia and Somaliland; also South-west Africa and South Africa.)

1. *nancillus* group. Size much smaller than other *Gerbillus* s.s. Sole very poorly haired. Head and body 54–60 mm. Sudan.
2. *vallinus* group. Transitionary towards *Dipodillus* in the poorly haired sole. Bullae relatively large. Tail longer than in other South African species. South Africa. Head and body up to 110.

   The three remaining groups are poorly distinguishable from each other.

3. *swalius* group. South African. Moderate sized: 76–112 mm. head and body. Bullae rather small. Tail rather short, under 120 per cent head and body length on average. With *swalius*, *calidus*, and *paeba*; the first two seem closely allied; I have seen very few specimens of the last named.
4. *gerbillus* group. Northern. Moderate-sized: not over 100 mm., thus at maximum rather smaller than largest members of group 3; tail on average, though not always, longer; usually over 120 per cent of head and body length. Head and body 74–99. Includes *gerbillus*, with which I think may be affiliated many "species" as races (listed below); *dunni*, with rather larger bullae, from Somaliland; the Asiatic forms (*arduus*, *gleadowi*, *cheesmani*), usually rather longer tailed than in *gerbillus* (though not

always); *cheesmani* has a powerfully ridged skull, and larger bullae than is usual in the group. Also *riggenbachi*, with a well-ridged skull, and *rosalinda*, with rather striking coloration, may be perhaps provisionally referred here.

5. *pyramidum* group. With strongly ridged skull, and size normally larger than in the last; usually over 100 mm. head and body (95–128). The form *hirtipes* may I think be regarded as a subspecies. Provisionally the Somali species *acticola* may be included here, though the size seems variable; the bullae are large; the tail is relatively longer than in *pyramidum* and races which are, for the genus, shortish-tailed forms. In the genus, the tail is always longer than head and body.

List of Named Forms

(References and type localities for most of the Gerbillinae are the work of Mr. R. W. Hayman. A few of the smaller genera are by Mr. G. W. C. Holt.)

Subgenus *Dipodillus*, Lataste

campestris Group

1. GERBILLUS POECILOPS, Yerbury & Thomas

1895. Proc. Zool. Soc. London, p. 549.
Lahej, Aden, S. Arabia.

2. GERBILLUS LOWEI, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 261.
Jebel Marra, Darfur.

3. GERBILLUS CAMPESTRIS CAMPESTRIS, Levaillant

1857. Atlas Expl. Sc. Alg. Mamm. pl. V, fig. 2.
Philippeville, Province of Constantine, Algeria.
Synonym: *gerbii*, Loche, 1858, Cat. Mamm. & Oiseaux Observées en Algerie, p. 23.
minutus, Loche, 1867, Expl. Alg. p. 109, Mamm.
deserti, Loche, 1867, Expl. Alg. p. 107.

4. GERBILLUS CAMPESTRIS ROZSIKAE, Thomas

1908. Ann. Mag. Nat. Hist. 8, II, p. 374.
Biskra, Algeria.

5. GERBILLUS CAMPESTRIS CINNAMOMEUS, Cabrera

1916. Bol. Real. Soc. Esp. Hist. Nat. 16, p. 385.
Taguidert, south of Mogador, Morocco.

6. GERBILLUS CAMPESTRIS RIPARIUS, Cabrera

1922. Bol. Real. Soc. Esp. Hist. Nat. 22, p. 112.
Wadi Martin, Morocco.

7. GERBILLUS CAMPESTRIS DODSONI, Thomas

1902. Proc. Zool. Soc. London, p. 7.
Ain Hammam, Tripoli.

8. GERBILLUS CAMPESTRIS PATRIZII, de Beaux

1932. Ann. Mus. Civ. Stor. Nat. Genova, LV, p. 379.
Oasis di Cufra, Libyan desert, Libya.

famulus Group

9. GERBILLUS FAMULUS, Yerbury & Thomas

1895. Proc. Zool. Soc. London, p. 551.
Lahej, Aden, S. Arabia.

garamantis Group

10. GERBILLUS NANUS, Blanford

1875. Ann. Mag. Nat. Hist. 4, XVI, p. 312.
Gedrosia, Baluchistan.

11. GERBILLUS INDUS, Thomas[1]

1920. Journ. Bombay Nat. Hist. Soc. XXVI, no. 4, p. 935.
Gambat, Khairpur, Sind, N.-W. India.

12. GERBILLUS GARAMANTIS GARAMANTIS, Lataste

1881. Le Naturaliste, Paris, 1, p. 507.
Sidi-Roueld, Ouargla, Algeria.

13. GERBILLUS GARAMANTIS ARABIUM, Thomas

1918. Ann. Mag. Nat. Hist. 9, II, p. 61.
Tebuk, Arabia.

14. GERBILLUS PRINCIPULUS, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 262.
El Malha, Jebel Maidob, N. Darfur.

dasyurus Group

15. GERBILLUS VIVAX, Thomas

1902. Proc. Zool. Soc. London, p. 8.
Sebha, Tripoli.

16. GERBILLUS MIMULUS, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 362.
Lahej, Aden, S. Arabia.

17. GERBILLUS DASYURUS, Wagner

1842. Arch. Naturg. 1, p. 20.
Sinai.
Synonym: *dasyuroides*, Nehring, 1901, Sitz. Ber. Ges. Nat. Fr. Berlin, p. 173. Palestine.

18. GERBILLUS AMOENUS, de Winton

1902. Ann. Mag. Nat. Hist. 7, IX, p. 46.
Giza Province, Egypt.

19. GERBILLUS WATERSI, de Winton

1901. Nov. Zool. VIII, p. 399.
Shendi, Nubia.

20. GERBILLUS STIGMONYX STIGMONYX, Heuglin

1877. Reise Nordost. Africa, 2, p. 78.
Khartoum, Sudan.

21. GERBILLUS STIGMONYX LUTEOLUS, Thomas

1901. Ann. Mag. Nat. Hist. 7, VIII, p. 275.
Duem, Sudan.

[1] *G. indus* probably belongs to the *dasyurus* group and is wrongly allocated here.

22. GERBILLUS HARWOODI HARWOODI, Thomas
1901. Ann. Mag. Nat. Hist. 7, VIII, p. 275.
Lake Naivasha, Kenya.

23. GERBILLUS HARWOODI LUTEUS, Dollman
1914. Ann. Mag. Nat. Hist. 8, XIV, p. 489.
S. Guaso Nyiro, Nyanza Province, Kenya.

24. GERBILLUS PERCIVALI, Dollman
1914. Ann. Mag. Nat. Hist. 8, XIV, p. 488.
Voi, Kenya.
(According to Hollister, this species may be the same as *pusillus*, No. 41.)

25. GERBILLUS SOMALICUS, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 197.
Upper Sheikh, Somaliland.

26. GERBILLUS BROCKMANI, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 420.
Burao, 85 miles south of Berbera, Somaliland

27. GERBILLUS MACKILLIGINI, Thomas
1904. Ann. Mag. Nat. Hist. 7, XIV, p. 158.
Wadi Alagi, eastern Egyptian desert.

simoni Group

28. GERBILLUS SIMONI, Lataste
1881. Le Naturaliste, Paris, I, p. 497.
Oued-Magra, north of Hodna, Algeria.

29. GERBILLUS JORDANI, Thomas
1918. Ann. Mag. Nat. Hist. 9, II, p. 60.
Guelt-es-Stel, Central Plateau, Algeria.

30. GERBILLUS HENLEYI, de Winton
1903. Nov. Zool. X, p. 284.
Zaghig, Wadi Natron, Egypt.

31. GERBILLUS MARIAE, Bonhote
1909. Proc. Zool. Soc. London, p. 792.
Mokattam Hills, Cairo, Egypt.

32. GERBILLUS MURICULUS, Thomas & Hinton
1923. Proc. Zool. Soc. London, p. 263.
Madu, 80 miles north-east of El Fasher, Darfur, Sudan.

33. GERBILLUS DIMINUTUS, Dollman
1911. Ann. Mag. Nat. Hist. 8, VII, p. 520.
Nyama Nyango, Guaso Nyiro, Kenya.

34. GERBILLUS JULIANI, St. Leger
1935. Ann. Mag. Nat. Hist. 10, XV, p. 669.
Bulhar, British Somaliland.

Species not allocated to Groups

35. GERBILLUS LIXA, Yerbury & Thomas
1895. Proc. Zool. Soc. London, p. 550.
Shaik Othman, Aden, Arabia.

36. GERBILLUS HILDA, Thomas

1918. Ann. Mag. Nat. Hist. 9, II, p. 62.
Sea coast 70 miles south-west of Tangier, Morocco.

37. GERBILLUS RUBERRIMUS, Rhoads

1896. Proc. Acad. Nat. Sci. Philadelphia, p. 538.
West Somaliland.

38. GERBILLUS BOTTAI, Lataste

1882. Le Naturaliste, Paris, II, p. 36.
Senaar, Sudan.

39. GERBILLUS VENUSTUS, Sundevall

1842. K. Svenska Vet. Akad. Handl. p. 230.
Near Bahr-el-Abiad, Sudan.

40. GERBILLUS QUADRIMACULATUS, Lataste

1882. Le Naturaliste, Paris, II, p. 27.
Nubia.

41. GERBILLUS PUSILLUS, Peters

1878. Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 201.
Taita, Kenya.
(See note under number 24, *percivali*).

42. GERBILLUS GROBBENI, Klaptocz

1909. Zool. Jahrb. Syst. 27, p. 252.
Dernah, north coast of Barka, Cyrenaica.

Subgenus *Gerbillus*, Desmarest

nancillus Group

43. GERBILLUS NANCILLUS, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 260.
45 miles north of El Fasher, Sudan

vallinus Group

44. GERBILLUS VALLINUS, Thomas

1918. Ann. Mag. Nat. Hist. 9, II, p. 148.
Tuin, Kenhart, Hartebeest River, Bushmanland, South Africa.

paeba-swalius Group

45. GERBILLUS SWALIUS SWALIUS, Thomas & Hinton

1925. Proc. Zool. Soc. London, p. 235.
Karibib, S.-W. Africa.

46. GERBILLUS SWALIUS ORALIS, Thomas & Hinton

1925. Proc. Zool. Soc. London, p. 236.
Rooibank, S.-W. Africa.

47. GERBILLUS SWALIUS LEUCANTHUS, Thomas

1927. Proc. Zool. Soc. London, p. 382.
Ondongwa, N.-W. Ovamboland.

48. GERBILLUS CALIDUS CALIDUS, Thomas

1918. Ann. Mag. Nat. Hist, 9, II, p. 63.
Molopo, Bechuanaland.

49. GERBILLUS CALIDUS KALAHARICUS, Roberts
1932. Ann. Transv. Mus. XV, p. 10.
Gomodino Pan, Central Kalahari.

50. GERBILLUS PAEBA PAEBA, Smith
1836. Rep. Exp. Int. S. Africa, app. p. 43.
Litaku, Bechuanaland.
Synonym: *tenuis*, Smith, 1849, Ill. Zool. S. Africa Mamm. pl. xxxvi, fig. 2 and text.

51. GERBILLUS PAEBA BROOMI, Thomas
1918. Ann. Mag. Nat. Hist. 9, II, p. 64.
Port Nolloth, Namaqualand.

52. GERBILLUS PAEBA COOMBSI, Roberts
1929. Ann. Transv. Mus. XIII, p. 98.
Zoutspansberg, west of Sand River, Transvaal.

gerbillus Group

53. GERBILLUS GERBILLUS GERBILLUS, Olivier
1801. Bull. Sci. Phil. Paris, II, p. 121.
Giza Province, Egypt.
Synonym: *aegyptius*, Desmarest, 1804, Nouv. Dict. H. N. XXIV, Tab. Méth. p. 22. Near Alexandria.
longicaudus, Wagner, 1843, Schreber Säug. Suppl. III, 477

54. GERBILLUS GERBILLUS ALLENBYI, Thomas
1918. Ann. Mag. Nat. Hist. 9, II, p. 146.
Rehoboth, near Jaffa, Palestine.

55. GERBILLUS GERBILLUS ANDERSONI, de Winton
1902. Ann. Mag. Nat. Hist. 7, IX, p. 45.
Mandara, Egypt.

56. GERBILLUS GERBILLUS BONHOTEI, Thomas
1919. Ann. Mag. Nat. Hist. 9, III, p. 560.
Khabra Abu Guzour, south-east of El Arish, N. Sinai.

57. GERBILLUS GERBILLUS EATONI, Thomas
1902. Proc. Zool. Soc. London, p. 6.
Eleusher, Tripoli.

58. GERBILLUS GERBILLUS LATASTEI, Thomas & Trouessart
1903. Bull. Soc. Zool. France, XXVIII, p. 172.
Kebili, S. Tunis.

59. GERBILLUS GERBILLUS AGAG, Thomas
1903. Proc. Zool. Soc. London, p. 296.
Agageh Wells, W. Kordofan.

60. GERBILLUS GERBILLUS NIGERIAE, Thomas & Hinton
1920. Nov. Zool. XXVII, p. 317.
Kano, N. Nigeria.

61. GERBILLUS GERBILLUS COSENSI, Dollman
1914. Abstract Proc. Zool. Soc. London, No. 131, p. 25; Proc. Zool. Soc. London, p. 311.
Ngamatak, Turkwel River, Uganda.

62. GERBILLUS DUNNI, Thomas
1904. Ann. Mag. Nat. Hist. 7, XIV, p. 101.
Gerlogubi, Somaliland.

63. GERBILLUS ARDUUS, Cheesman & Hinton
1924. Ann. Mag. Nat. Hist. 9, XIV, p. 551.
Jafura, Central Arabia.

64. GERBILLUS GLEADOWI, Murray
1886. Ann. Mag. Nat. Hist. 5, XVII, p. 246.
Rohri, Upper Sind, N.-W. India.

65. GERBILLUS CHEESMANI, Thomas
1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 748.
Near Basra, Lower Euphrates.

66. GERBILLUS RIGGENBACHI, Thomas
1903. Nov. Zool. X, p. 301.
Rio de Oro, W. Sahara.

67. GERBILLUS ROSALINDA, St. Leger
1929. Ann. Mag. Nat. Hist. 10, IV, p. 295.
Abu Zabad, Kordofan.

pyramidum Group

68. GERBILLUS ACTICOLA, Thomas
1918. Ann. Mag. Nat. Hist. 9, II, p. 147.
Berbera, Somaliland.

69. GERBILLUS PYRAMIDUM PYRAMIDUM, Geoffroy
1825. Dict. Class. Hist. Nat. VII, p. 321.
Giza Province, Egypt.
Synonym: *burtoni*, Cuvier, 1838, Trans. Zool. Soc. London, II, p. 145.
pygargus, Cuvier, 1838, Trans. Zool. Soc. London, II, p. 142.
dongolanus, Heuglin, 1877, Reise N. Ost. Afr. II, p. 79.
Dongola, Sudan.

70. GERBILLUS PYRAMIDUM TARABULI, Thomas
1902. Proc. Zool. Soc. London, p. 5.
Sebha, Tripoli.

71. GERBILLUS PYRAMIDUM FLOWERI, Thomas
1919. Ann. Mag. Nat. Hist. 9, III, p. 559.
South of El Arieh, N. Sinai.

72. GERBILLUS PYRAMIDUM HIRTIPES, Lataste
1882. Le Naturaliste, Paris, II, p. 21.
Bamendile, Ouargla, Algeria.

73. GERBILLUS PYRAMIDUM HESPERINUS, Cabrera
1906. Bol. Real. Soc. Esp. Hist. Nat. p. 365.
Mogador, Morocco.

Not allocated to Group

74. GERBILLUS PULVINATUS, Rhoads
1896. Proc. Acad. Nat. Sci. Philadelphia, p. 537.
Lake Rudolf.
(Described as near *pyramidum*).

75. GERBILLUS BILENSIS, Frick
1914. Ann. Carnegie Mus. IX, p. 12.
Bilen, Abyssinia.

76. GERBILLUS DALLONII, Heim de Balsac
1936. Mem. Acad. Sci. Paris, 62, p. 43.
Tibesti, Chad Military Territory.

77. GERBILLUS FOLEYI, Heim de Balsac
1936. Suppl. au Bull. Biol. de France et de Belgique, Paris, 21, 317, 389.
Beni-abbes, W. Algeria.

Genus 2. MICRODILLUS, Thomas

1910. MICRODILLUS, Thomas, Ann. Mag. Nat. Hist. 8, V, p. 197.

TYPE SPECIES.—*Dipodillus peeli*, de Winton.

RANGE.—Somaliland.

NUMBER OF FORMS.—One.

CHARACTERS.—Tail well haired, but considerably shorter than head and body, and not tufted. Hindfoot with naked sole.

Skull differing from *Dipodillus* in the more narrowed interorbital region (which narrows abruptly, differing from any *Dipodillus* seen); the skull is more bowed than in *Dipodillus*; the bullae are large, though the mastoids do not appear conspicuously in superior aspect of skull; they surpass the occiput posteriorly. Supraorbital ridges feeble; posterior palatal foramina well developed. The braincase is broad. The tail is about 79 per cent of head and body length. The head and body length is about 66–73 mm.

This form differs from *Dipodillus* in a combination of rather trivial cranial and external characters which are, however, clearly marked, and so it may perhaps stand as a genus.

Forms seen: *peeli*.

LIST OF NAMED FORMS

1. MICRODILLUS PEELI, de Winton
1898. Ann. Mag. Nat. Hist. 7, I, p. 250.
Eik, Somaliland.

Genus 3. TATERA, Lataste

1882. TATERA, Lataste, Le Naturaliste, Paris, II, p. 126.
1917. TATERONA, Wroughton, Journ. Bombay, Nat. Hist. Soc. XXV, no. 1, p. 40 (*Gerbillus afer*, Gray.)
1897. GERBILLISCUS, Thomas, Proc. Zool. Soc. London, p. 433. (*Gerbillus boehmi*, Noack.) Valid as a subgenus.

TYPE SPECIES.—*Dipus indicus*, Hardwicke.

RANGE.—India, from Punjab and Sind south through the Peninsula, to Ceylon, east to Bengal. Persia, Mesopotamia, Syria. Africa, south of the Sahara; Gambia, Nigeria, Gold Coast; Sudan, Abyssinia, Somaliland, Kenya, Uganda, Tanganyika, East Congo, Angola, Portuguese East Africa, South-west Africa, and generally throughout South Africa, Arabia.

Number of Forms.—About ninety.

Characters.—This genus contains large numbers of Gerbils which, though dentally about as *Gerbillus*, differ in the more strongly ridged and upstanding occipital region as a rule, the smaller bullae (on average, mastoids about at minimum for subfamily), and the more Ratlike general external appearance. The braincase as a rule seems not to appear so enlarged and broadened posteriorly as in the other genera. Supraorbital ridges usually present, but as a rule not very heavy (for instance, the skull is less prominently ridged in large species of *Tatera* than in such types as *Rhombomys*). Rostrum pointed and narrow usually; zygomatic plate always very strongly projected forwards, more so than in any other genus, so far as I have seen; the infraorbital foramen narrowed, particularly below; in some forms, particularly the Asiatic species, the zygomatic plate is curved round in front, so that its lower border is curved backwards to a degree. Upper incisors typically one-grooved, often opisthodont. In the subgenus *Gerbilliscus*, there are very faint traces of two grooves; or in this subgenus, the incisors may be practically plain. They are also almost plain in *liodon*, though not in all its races. Anterior palatal foramina long, usually reaching the toothrows, or almost so. Posterior palatal foramina variable, sometimes much reduced, sometimes comparatively lengthened, though less so than in *Taterillus*. Paroccipital process large. Bullae large for a Muroid, but not comparing with the majority of the Gerbillinae in size, as a rule. Upper cheekteeth less hypsodont than in *Meriones*, and cuspidate originally; in the adult they are mostly a series of plain straight plates, being rather simpler than *Gerbillus*, though with the same general arrangement; M.3 not excessively reduced, usually bilaminate. M.1 evidently four-rooted. Lower molars normal, but the anterior lamina of M.1 may have a small fold present in the front of the tooth. In some forms the lower incisor root tends to be apparent on the mandible.

Fur medium or soft; sole naked; tail may be slightly shorter than head and body length, or considerably longer than this measurement; it is fully haired, and may be conspicuously tufted in some forms. D.5 of hindfoot considerably shorter than the three central digits; hindfoot narrow. Form often heavy and Ratlike. Foreclaws tend to become prominent.

Wroughton's "excuse" for dividing the Indian species from the African generically is so weak that it appears waste of time and space to repeat the characters. "*Taterona*" was erected on a trivial character of the shape of the parietals, which if constant in African forms is not so in the Asiatic races; and the colour of the tail, which is hardly a specific character in the group as it seems variable in many of the African forms. How this name, based on characters such as these, has ever been in general use is something of a mystery.

The group is an exceedingly difficult one to arrange in any natural order, and it appears that there are far too many species. Wroughton (Ann. Mag. Nat. Hist. 7, XVII, p. 474, 1906) gave a key to the forms, and described many new species. This arrangement appears to be weakened by the amount of variation shown in large series of specimens in head and body length measurements, so that I do not think his arrangement would stand in a general revision.

Hinton & Kershaw stated that in the northern part of Africa two groups were recognizable, the *robusta* type (with *nigricauda*, *macropus*, etc.), with opisthodont incisors, small molars, and tufted tail; and the *benvenuta-liodon* type, with orthodont incisors, large molars, and tail without tuft.

Kershaw had previously divided the African forms into two groups, those with tufted tails, in which the posterior palatal foramina were longer, and those without tufted tails, in which these foramina were shorter; remarking that the tufted-tail species agreed in the characters of the length of the palatal foramina with the Indian species, which also have a well-tufted tail; but these foramina vary within the Asiatic group.

The arrangement of groups based on forms with tufted or untufted tails is weakened by the fact that there is a certain amount of variation in the development or otherwise of the tuft. It may, for instance, appear in *schinzi*, which is normally untufted.

However, for the present I see no other way to divide the genus. The groups recognized here are very provisional.

The characters given for the groups cannot for the moment be correlated with the cranial characters given for the groups by Hinton & Kershaw. A detailed revision of this genus is undoubtedly much needed. I provisionally recognize the following groups:

1. *indica* group. The tail is coloured dark above and below, and pale at the sides, and bears a well-marked tuft. The size is as a rule large (up to 187 mm. head and body or perhaps more).

   I do not think that there is more than one valid species in this group. All races with extremes of colour seem to intermix with a race of more normal colour, from one to the other. The forms *cuvieri* and *ceylonica* have, it is true, a proportionately longer tail; but *hardwickei* seems to be intermediate, at least on average, in this respect. I therefore list all named forms provisionally as subspecies of *indica*.
2. *robusta* group. The tail is not coloured as in the Indian and Persian species, being dark above, light below (in all African species except *nigricauda*, in which it is entirely black). The tail is, normally, conspicuously tufted. This includes several species from North and East Africa. *T. nigricauda* at first sight appears very distinct, on account of its black tail; but in the race *nyama*, it is not wholly black; and according to Hollister, *vicina* should be regarded as a closely allied type. *T. minuscula* appears a very small species (about 109 head and body); the other members of the group are moderate-sized, and include *phillipsi* and *shoana* from Abyssinia, *macropus* from Sudan, *swaythlingi* from Tanganyika, and *guineae* from West Africa.
3. *afra* group. To this may be referred a very large number of named species and races, including all the southern forms. According to Shortridge, there are 6 mammae in *brantsi* (of which I think *draco* is

not more than a subspecies), and 8 in the other South African types, as *afra*, *lobengulae*, *schinzi*, *miliaria*. Normally the tail is not tufted. A specimen of *leucogaster* at the British Museum is labelled as with 6 mammae. The group appears to be represented in West Africa by a number of species which may all be the same, but provisionally they are retained as species. The forms *inclusa* and *nyasae* are provisionally listed as full species; I think these will be either races of *lobengulae* or *miliaria*. *T. nigrita*, a small dark form, and *T. taborae*, are probably distinct species.

4. *liodon* group. Doubtfully distinguishable from the above, but with a tendency, most pronounced in typical *liodon*, for the incisors to be almost plain; and at extreme development tending to become largest of African forms (up to 190 mm. head and body). Perhaps on average larger than the *afra* group, but there is much variation in this character. Includes *liodon* and its races (including *ruwenzori* apparently), *benvenuta*, the forms *soror* and *flavipes* (not seen, but said to be near *benvenuta* by Hinton & Kershaw); also *valida* and *dichrura*.
5. *ruddi* group. Containing one species, with an unusually long tail (over 130 per cent of head and body length), the tail not tufted, but with terminal portion white. The incisors are clearly grooved. This species, but for the grooving of the incisors, seems very near *fallax*, a member of the subgenus *Gerbilliscus*. Apart from *ruddi* and *Gerbilliscus*, the tail is, as far as traced, less than 130 per cent of head and body length in the genus.
6. *boehmi* group. Subgenus GERBILLISCUS. Incisors very faintly grooved; typically with traces of two grooves. Tail with terminal portion white, and the tail normally much lengthened (about as *ruddi*). To this subgenus have been referred *boehmi*, *fallax*, and *fraterculus*. The size is large for the genus. *T. boehmi* has the tail tufted.

Forms seen: *afra*, *angolae*, *bailwardi*, *bechuanae*, *benvenuta*, *boehmi*, *brantsi*, *ceylonica*, *cosensi*, *cuvieri*, *dichrura*, *draco*, *dundasi*, *dunni*, *fallax*, *fraterculus*, *gambiana*, *giffardi*, *griquae*, *guineae*, *hardwickei*, *hopkinsoni*, *iconica*, *inclusa*, *indica*, *joanae*, *kempii*, *leucogaster*, *liodon*, *lobengulae*, *lucia*, *mashonae*, *miliaria*, *minuscula*, *mombasae*, *monticola*, *ndolae*, "*neavei*," *nigrita*, *nigricauda*, *nyama*, *nyasae*, *panja*, *perpallida*, *persica*, *phillipsi*, *picta*, *pitmani*, *robusta*, *ruddi*, *ruwenzori*, *salsa*, *scansa*, *schinzi*, *sherrini*, *shirensis*, *smithi*, *stellae*, *swaythlingi*, *taborae*, *taeniura*, *umbrosa*, *valida*, *welmanni*.

LIST OF NAMED FORMS

Subgenus *Tatera*, Lataste

indica Group

1. TATERA INDICA INDICA, Hardwicke

1807. Trans. Linn. Soc. London, VIII, p. 279.
India. (?Kumaon).
Synonym: *otaria*, Cuvier, Trans. Zool. Soc. London, II, p. 144, pl. 26, figs. 14–18, 1838.

2. TATERA INDICA DUNNI, Wroughton

1917. Journ. Bombay Nat. Hist. Soc. XXV, 1, p. 43.
Punjab, Ambala.

3. TATERA INDICA SHERRINI, Wroughton

1917. Journ. Bombay Nat. Hist. Soc. XXV, 1, p. 43.
Jacobabad, Sind.

4. TATERA INDICA HARDWICKEI, Gray

1843. List. Mamm. p. 132.
Dharwar, India.

5. TATERA INDICA CUVIERI, Waterhouse

1838. Proc. Zool. Soc. London, p. 56.
Arcot, Madras, India.

6. TATERA INDICA CEYLONICA, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, pp. 477, 499.
Ceylon.

7. TATERA INDICA PERSICA, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, pp. 477, 496.
Seistan, Persia

8. TATERA INDICA SCANSA, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, pp. 477, 496.
Kerman, Persia.

9. TATERA INDICA BAILWARDI, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, pp. 477, 498.
Karun River, Persia.

10. TATERA INDICA MONTICOLA, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, pp. 477, 498.
Mala Mir, Persia.

11. TATERA INDICA TAENIURA, Wagner

1842. Schreber's Säug. Suppl. III, p. 471.
Syria.

12. TATERA INDICA PITMANI, Cheesman

1921. Journ. Bombay Nat. Hist. Soc. XXVII, p. 337.
Tigris, Mesopotamia.

robusta Group

13. TATERA ROBUSTA ROBUSTA, Cretzchmar

1826. Atlas Reise. Nordl. Afrika von Rüppell, I, p. 75, pl. 29, fig. b.
Ambukol, Sudan.
Synonym: *murina*, Sundevall, 1842, K. Svenska Vet. Ak. Handl. p. 231. White Nile.

14. TATERA ROBUSTA TAYLORI, Hatt

1935. Amer. Mus. Nov. 791, p. 1.
Khor Birum, Red Sea Hills, Sudan.

15. TATERA MACROPUS, Heuglin

1864. Nov. Act. Acad. Caes. Leop. Dresden, 31, act. 7, p. 9.
Bongo, Sudan.

16. TATERA PHILLIPSI PHILLIPSI, de Winton
1898. Ann. Mag. Nat. Hist. 7, I, p. 253.
Hanka Dadi, Somaliland.

17. TATERA PHILLIPSI UMBROSA, Dollman
1912. Ann. Mag. Nat. Hist. 8, IX, p. 219.
Baringo, Kenya.

18. TATERA SHOANA, Wroughton
1906. Ann. Mag. Nat. Hist. 7, XVII, pp. 477, 492.
Jefer Medir, Somaliland.

19. TATERA MINUSCULA, Osgood
1936. Field. Mus. Nat. Hist. Pub. Zool. ser. XX, p. 230.
Sheik Hussein, near Webbi Shebeli River, Bale, Abyssinia.

20. TATERA SWAYTHLINGI, Kershaw
1921. Ann. Mag. Nat. Hist. 9, VIII, p. 565.
Morogoro, Tanganyika.

21. TATERA VICINA VICINA, Peters
1878. Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 200.
Kitui, Kenya.
Synonym: *mombasae*, Wroughton, 1906, Ann. Mag. Nat. Hist. 7, XVII, p. 493. Takaungu, Kenya.

22. TATERA VICINA BODESSANA, Frick
1914. Ann. Carnegie Mus. IX, p. 15.
Bodessa, Abyssinia.

23. TATERA VICINA MUANSAE, Matschie
1911. Sitz. Ber. Ges. Nat. Fr. Berlin, p. 333.
Mwanza, Tanganyika.

24. TATERA VICINA ICONICA, Dollman
1911. Ann. Mag. Nat. Hist. 8, VII, p. 521.
Nyama Nyangu, northern Guaso Nyiro, Kenya.

25. TATERA VICINA POTHAE, Heller
1910. Smiths. Misc. Coll. LVI, no. 9, p. 2.
Potha, Kapiti Plains, Kenya.

26. TATERA NIGRICAUDA NIGRICAUDA, Peters
1878. Monatsber. K. Preuss. Akad. Wiss. Berlin, p. 200.
Ndi, Taita, Kenya.

27. TATERA NIGRICAUDA NYAMA, Dollman
1911. Ann. Mag. Nat. Hist. 8, VII, p. 522.
Nyama Nyangu, northern Guaso Nyiro, Kenya.

28. TATERA NIGRICAUDA PERCIVALI, Heller
1914. Smiths. Misc. Coll. LXIII, no. 7, p. 8.
Lorian Swamp, Kenya.

29. TATERA NIGRICAUDA BAYERI, Lönnberg
1918. Rev. Zool. Afr. 5, p. 179.
Maroon River, near Mt. Elgon, Kenya.

30. TATERA NIGRICAUDA BODESSAE, Frick
1914. Ann. Carnegie Mus. IX, p. 14.
Sagan River, Bodessa, Abyssinia.

31. TATERA GUINEAE GUINEAE, Thomas
1910. Ann. Mag. Nat. Hist. 8, V, p. 353.
Gunnal, Portuguese Guinea.

32. TATERA GUINEAE PICTA, Hayman
1935. Proc. Zool. Soc. London, p. 930.
Pong, Tamale, N. Territories of Gold Coast.

liodon Group

33. TATERA BENVENUTA BENVENUTA, Hinton & Kershaw
1920. Ann. Mag. Nat. Hist. 9, VI, p. 97.
Mongalla, Sudan.

34. TATERA BENVENUTA LUCIA, Hinton & Kershaw
1920. Ann. Mag. Nat. Hist. 9, VI, p. 99.
Musisi River, Lake Albert, Uganda.

35. TATERA SOROR, G. M. Allen
1914. Bull. Mus. Comp. Zool. Harvard Coll. LVIII, 7, p. 333.
Fazogli, Blue Nile, Sudan.

36. TATERA FLAVIPES, G. M. Allen
1914. Bull. Mus. Comp. Zool. Harvard Coll. LVIII, 7, p. 331.
Above Roseires, Blue Nile, Sudan.

37. TATERA LIODON LIODON, Thomas
1902. Ann. Mag. Nat. Hist. 7, IX, p. 441.
Lake Mweru, N. Rhodesia.
Synonym: *neavei*, Wroughton, 1907, Mem. Manchester Phil. & Lit. Soc. LI, no. 5, p. 18. Ndola, N. Rhodesia.

38. TATERA LIODON SMITHI, Wroughton
1909. Ann. Mag. Nat. Hist. 8, III, p. 249.
Mubende, Unyoro, Uganda.

39. TATERA LIODON DUNDASI, Wroughton
1909. Ann. Mag. Nat. Hist. 8, IV, p. 539.
Kirui, Mt. Elgon, Kenya.

40. TATERA LIODON RUWENZORII, Thomas & Wroughton
1910. Trans. Zool. Soc. London, XIX, p. 500.
Ruwenzori, Uganda.

41. TATERA DICHRURA, Thomas
1915. Ann. Mag. Nat. Hist. 8, XVI, p. 147.
Poko, Upper Welle, Congo.

42. TATERA VALIDA, Bocage
1890. J. Sci. Math. Phys. Nat. Lisbon, pt. V, p. 6.
Caconda, Angola.

afra Group

43. TATERA NIGRITA NIGRITA, Wroughton
1906. Ann. Mag. Nat. Hist. 7, XVII, p. 491.
Masindi, Unyoro, Uganda.

44. TATERA NIGRITA BENIENSIS, Hatt
1935. Amer. Mus. Nov. 791, p. 2.
Beni, E. Congo.

45. TATERA BRANTSI BRANTSI, Smith

1836. Rep. Exp. Int. S. Afr. Appendix, p. 43.
Orange River Colony.
Synonym: *montanus*, Smith, 1840, Ill. S. Afr. Zool. pl. 36, fig. 1. Orange River Colony.
maccalinus, Sundevall, 1846, Ofv. K. Svenska Vetensk Akad. Stockholm, p. 120. Transvaal, Magaliesberg.

46. TATERA BRANTSI PERPALLIDA, Dollman

1910. Ann. Mag. Nat. Hist. 8, VI, p. 394.
East Bank Tamalakan River, Ngamiland, Bechuanaland.

47. TATERA BRANTSI DRACO, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 479.
Wakkerstroom, S.-E. Transvaal.

48. TATERA LEUCOGASTER, Peters

1852. Reise nach Mossambique: Säugeth, p. 145, pl. 33, fig. 1, pl. 35, fig. 4.
Coast of N. Zambesi, Portuguese E. Africa.

49. TATERA AFRA AFRA, Gray

1830. Spicil. Zool. pt. 2, p. 10.
Cape Town.
Synonym: *africanus*, Cuvier, 1836, Trans. Zool. Soc. London, p. 141.
schlegelii, Smuts, Enum. Mamm. Cap. p. 41, 1832.

50. TATERA AFRA GILLI, Roberts

1929. Ann. Transv. Mus. XIII, p. 100.
Lambert's Bay, Cape.

51. TATERA LOBENGULAE LOBENGULAE, de Winton

1898. Ann. Mag. Nat. Hist. 7, II, p. 4.
Essex Vale, near Bulawayo, S. Rhodesia.

52. TATERA LOBENGULAE BECHUANAE, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 482.
Molopo, Bechuanaland.

53. TATERA LOBENGULAE GRIQUAE, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 483.
Kuruman, Bechuanaland.
Synonym: *miliaria stellae*, Wroughton, 1906, Ann. Mag. Nat. Hist. 7, XVII, p. 485. Kuruman, Bechuanaland.

54. TATERA LOBENGULAE MASHONAE, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 483.
Mazoe, Mashonaland.

55. TATERA LOBENGULAE PESTIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 103.
Bothaville, Orange Free State.

56. TATERA LOBENGULAE MITCHELLI, Roberts

1929. Ann. Transv. Mus. XIII, p. 103.
Wonderfontein, Transvaal.

57. TATERA LOBENGULAE PRETORIAE, Roberts

1929. Ann. Transv. Mus. XIII, p. 104.
Pretoria North, Transvaal.

58. TATERA LOBENGULAE LIMPOPOENSIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 104.
Njellele River, Zoutspansberg district, Transvaal.

59. TATERA LOBENGULAE TZANEENENSIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 105.
Tzaneen, N.-E. Transvaal.

60. TATERA LOBENGULAE LITTORALIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 105.
Masiene, coast of Portuguese E. Africa.

61. TATERA LOBENGULAE BEIRENSIS, Roberts

1929. Ann. Transv. Mus. XIII, p. 106.
Near Beira, Portuguese E. Africa.

62. TATERA LOBENGULAE NDOLAE, Kershaw

1922. Ann. Mag. Nat. Hist. 9, X, p. 105
Ndola, N. Rhodesia.

63. TATERA LOBENGULAE ZULUENSIS, Roberts

1931. Ann. Transv. Mus. XIV, p. 230.
Zululand.

64. TATERA LOBENGULAE PANJA, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 486.
60 miles above Tette, Mozambique.

65. TATERA SCHINZI, Noack

1889. Zool. Jahrb. Band IV, p. 134.
Kalahari, S.-W. Africa.

66. TATERA JOANAE, Thomas

1926. Proc. Zool. Soc. London, p. 299.
Ukuambi, Ovamboland.

67. TATERA MILIARIA MILIARIA, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 484.
Deelfontein, Cape Colony.

68. TATERA MILIARIA SALSA, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 485.
Zoutspansberg, Transvaal.

69. TATERA ANGOLAE, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 488.
Fort Quilenges, Angola.
Synonym: *nigrotibialis*, Monard, 1933, Bull. Soc. Neuchatel, 57, p. 54.
Angola.

70. TATERA INCLUSA, Thomas & Wroughton

1908. Proc. Zool. Soc. London, p. 169.
Gorongoza, Portuguese E. Africa.

71. TATERA NYASAE NYASAE, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 490.
Deep Bay, Lake Nyasa.

72. TATERA NYASAE SHIRENSIS, Wroughton

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 490.
Mt. Malosa, Upper Shire, Nyasaland.

73. TATERA NYASAE LOVERIDGEI, Hatt
1935. Amer. Mus. Nov. 791, p. 2.
Kilosa, Tanganyika.

74. TATERA COSENSI, Kershaw
1921. Ann. Mag. Nat. Hist. 9, VIII, p. 567.
Ruvu Station, 40 miles inland from Dar-es-Salaam, Tanganyika.

75. TATERA KEMPII, Wroughton
1906. Ann. Mag. Nat. Hist. 7, XVII, p. 375.
Anambra Creek, S. Nigeria.

76. TATERA HOPKINSONI, Thomas
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 375.
Kudang, Gambia.

77. TATERA GIFFARDI, Wroughton
1906. Ann. Mag. Nat. Hist. 7, XVII, p. 489.
Gambaga, Gold Coast.

78. TATERA GAMBIANA, Thomas
1910. Ann. Mag. Nat. Hist. 8, VI, p. 428.
Marakissa, Gambia.

79. TATERA WELMANNI, St. Leger
1929. Ann. Mag. Nat. Hist. 10, III, p. 387.
Maiduguri, N. Nigeria.

80. TATERA TABORAE, Kershaw
1921. Ann. Mag. Nat. Hist. 9, VIII, p. 566.
Tabora, Tanganyika.

ruddi Group

81. TATERA RUDDI RUDDI, Wroughton
1906. Ann. Mag. Nat. Hist. 7, XVII, p. 478.
Umvolosi, Zululand.

82. TATERA RUDDI TONGENSIS, Roberts
1931. Ann. Transv. Mus. XIV, p. 230.
Maputa, N. Zululand.

Subgenus *Gerbilliscus*, Thomas

83. TATERA FALLAX, Thomas & Schwann
1904. Abstr. Proc. Zool. Soc. London, no. 6, p. 22; Proc. Zool. Soc. London, p. 461.
Burumba, Ankole, S.-W. Uganda.

84. TATERA FRATERCULUS, Thomas
1898. Proc. Zool. Soc. London, p. 392.
Songwe, N. Nyasa.

85. TATERA BOEHMI BOEHMI, Noack
1888. Zool. Jahrb. Syst. II, p. 241.
Marunga, N. Rhodesia.

86. TATERA BOEHMI VARIA, Heller
1910. Smiths. Misc. Coll. LVI, no. 9, p. 1.
S. Guaso Nyiro, Sotik district, Kenya.

Species not allocated to Groups

87. TATERA BREYERI, Roberts
1926. Ann. Transv. Mus. XI, p. 250
Nylstroom, Transvaal.
(Described as near *brantsi*.)

88. TATERA NATALENSIS, Roberts
1929. Ann. Transv. Mus. XIII, p. 101.
Lidgetton, Natal.
(Described as near *ruddi*.)

89. TATERA CAFFER, Wagner
1842. Archiv. für Naturg, I, p. 18.
S. Africa.

90. TATERA MAPUTA, Roberts
1936. Ann. Transv. Mus. XVIII, p. 238.
Maputa, N. Zululand.

Genus 4. TATERILLUS, Thomas

1910. Taterillus, Thomas, Ann. Mag. Nat. Hist. 8, VI, p. 222.
1916. Taterina, Wettstein, Anz. Akad. Wiss. Wien. 53, p. 152. (*Taterina lorenzi*, Wettstein.)

Type Species.—*Gerbillus emini*, Thomas.

Range.—African: Senegal, Nigeria, Lake Chad, Sudan, East Congo, Uganda, Kenya, Abyssinia.

Number of Forms.—Twenty.

Characters.—Like *Tatera*, but usually smaller, and posterior palatal foramina always much lengthened, as a rule reaching forward to level of front molars, and often nearly as long as toothrow; sometimes broadened. Anterior palatal foramina broad, of medium length. Upper incisors grooved. Zygomatic plate usually as in *Tatera*, but sometimes a little less extreme. Supraorbital ridges present or traceable in adult. Molars as in *Tatera*; second lower molar often tends to be large.

Tail usually well tufted. Hindfoot long, usually with naked sole, but this sometimes hairy in the region of the hallux. Head and body about 100–130; tail considerably longer than head and body.

For the status of "*Taterina*," Wettstein, see Thomas & Hinton, 1923, Proc. Zool. Soc. London, p. 257.

Whether there is more than one valid species in this genus is not clear. I am inclined to doubt it.

Forms seen: *angelus*, *butleri*, *clivosus*, *congicus*, *emini*, *gyas*, *gracilis*, *harringtoni*, *illustris*, *lacustris*, *lowei*, *nigeriae*, *nubilus*, *osgoodi*, *perluteus*, *rufus*, *tenebricus*.

List of Named Forms

1. TATERILLUS GRACILIS GRACILIS, Thomas
1892. Ann. Mag. Nat. Hist. 6, IX, p. 77.
Gambia.

2. TATERILLUS GRACILIS ANGELUS, Thomas & Hinton
1920. Nov. Zool. XXVII, p. 317.
Kano, N. Nigeria.

3. TATERILLUS NIGERIAE, Thomas
1911. Ann. Mag. Nat. Hist. 8, VII, p. 459.
Kabwir, N. Nigeria.

4. TATERILLUS LACUSTRIS, Thomas & Wroughton
1907. Ann. Mag. Nat. Hist. 7, XIX, p. 378.
Lake Chad.

5. TATERILLUS CONGICUS, Thomas
1915. Ann. Mag. Nat. Hist. 8, XVI, p. 147.
Poko, Upper Welle, Congo.

6. TATERILLUS EMINI EMINI, Thomas
1892. Ann. Mag. Nat. Hist. 6, IX, p. 78.
Wadelai, N. Uganda.

7. TATERILLUS EMINI ZAMMARANI, de Beaux
1922. Att. Soc. Ital. Sci. Nat. 61, p. 26.
Dolo, Abyssinia.

8. TATERILLUS EMINI ANTHONYI, Hatt
1934. Amer. Mus. Nov. 708, p. 2.
West bank of the Nile, south of Jebelein, Sudan.

9. TATERILLUS OSGOODI, Wroughton
1910. Ann. Mag. Nat. Hist. 8, VI, p. 293.
Voi, Kenya.

10. TATERILLUS NUBILUS NUBILUS, Dollman
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 656.
Mt. Nyiro, Kenya.

11. TATERILLUS NUBILUS ILLUSTRIS, Dollman
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 656.
12 miles north of N. Guaso Nyiro, Kenya.

12. TATERILLUS LOWEI, Dollman
1914. Abstr. Proc. Zool. Soc. London, p. 25; Proc. Zool. Soc. London, p. 312.
10 miles west of Ngamatak Hills, Turkwel River, Uganda.

13. TATERILLUS MELANOPS, G. M. Allen
1912. Bull. Mus. Comp. Zool. Harvard Coll. LIV, p. 446.
Meru River, N. Guaso Nyiro, Kenya.

14. TATERILLUS TENEBRICUS, Dollman
1911. Ann. Mag. Nat. Hist. 8, VII, p. 520.
Nyama Nyangu, N. Guaso Nyiro, Kenya.

15. TATERILLUS HARRINGTONI, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 303.
East of Lake Rudolf.

16. TATERILLUS RUFUS, Wettstein
1916. Anz. Akad. Wiss. Wien. 53, p. 151.
El Obeid, Sudan.

17. TATERILLUS GYAS, Thomas

1918. Ann. Mag. Nat. Hist. 9, II, p. 150.
Kamissa, Dinder River, Sudan.

18. TATERILLUS CLIVOSUS, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 258.
Jebel Marra, Darfur, Sudan.

19. TATERILLUS PERLUTEUS, Thomas & Hinton

1923. Proc. Zool. Soc. London, p. 259.
100 miles east of El Fasher, Sudan.

20. TATERILLUS BUTLERI, Wroughton

1910. Ann. Mag. Nat. Hist. 8, VI, p. 294.
Dug-dug, Bahr-el-Ghazal.
Synonym: *kadugliensis*, Wettstein, 1916, Anz. Akad. Wiss. Wien. 53, p. 151. Kadugli, S. Kordofan. Status *fide* Thomas & Hinton, 1923.
lorenzi, Wettstein, 1916, Anz. Akad. Wiss. Wien. 53, p. 152. El Obeid, Kordofan. Status *fide* Thomas & Hinton, 1923.

Genus 5. DESMODILLUS, Thomas & Schwann

1904. DESMODILLUS, Thomas & Schwann, Abstr. Proc. Zool. Soc. London, p. 6; Proc. Zool. Soc. London, p. 177.

TYPE SPECIES.—*Gerbillus auricularis*, Smith.

RANGE.—South-west Africa, and South Africa.

NUMBER OF FORMS.—Two.

CHARACTERS.—The mastoids appear conspicuously at the back of each side of the skull in superior aspect, and project backwards behind the foramen magnum to a certain degree. The bullae are much more inflated than is normal in *Gerbillus*, though considerably less so than in *Pachyuromys*. Posterior palatal foramina well developed, but not widened. Supraorbital ridges developed; grooving of upper incisors faint. Other cranial characters, and dental characters, much as in *Gerbillus*. Hindfoot with sole hairy. Tail well haired, considerably shorter than in *Gerbillus*; shorter than head and body, not tufted, but not club-shaped (compare *Pachyuromys*). Head and body about 90–122 mm. Mammae 2—2=8 (Shortridge). This author states that it runs like an ordinary Rat, and is not saltatorial. The tail is roughly 78 per cent of head and body length; the hindfoot about 20–22 per cent of this measurement.
Forms seen: *auricularis*, *pudicus*.

LIST OF NAMED FORMS

1. DESMODILLUS AURICULARIS AURICULARIS, Smith

1834. S. Afr. Quart. Journ. ii, p. 160.
Kamiesberg, Namaqualand.
Synonym: *brevicaudatus*, Cuvier, 1836, Trans. Zool. Soc. London, II, p. 144. (Cape.)

2. DESMODILLUS AURICULARIS PUDICUS, Dollman
1910. Ann. Mag. Nat. Hist. 8, VI, p. 395.
Lehutitung, Kalahari.

Genus 6. DESMODILLISCUS, Wettstein

1917. DESMODILLISCUS, Wettstein, Denkschr. Akad. Wiss. Wien. 94, p. 115.

TYPE SPECIES.—*Desmodilliscus braueri*, Wettstein.

RANGE.—Known from Sudan and North Nigeria.

NUMBER OF FORMS.—Two.

CHARACTERS.—Skull rather like that of a *Desmodillus* in miniature; bullae much inflated; mastoids appearing conspicuously when skull is viewed from above. Palate broad, the anterior foramina wide, the second pair long, nearly as long as toothrow, and much broadened, as in *Pachyuromys*, or to an even greater degree. Coronoid process very small.

Upper cheekteeth of *Gerbillus* type: M.3 extremely reduced. Lower cheekteeth: M.2 relatively large; M.3 entirely suppressed. The genus therefore has a cheektooth formula ($\frac{3}{2}$) not known elsewhere in the family Muridae.

Cheekpouches said to be present. Size very small; tail shorter than head and body, not tufted; sole naked. Very few specimens examined.

Head and body about 50–60; tail about 76 per cent head and body length.

Forms seen: *braueri*, *buchanani*. I do not think there is more than one valid species.

LIST OF NAMED FORMS

1. DESMODILLISCUS BRAUERI BRAUERI, Wettstein
1917. Denkscrh. Akad. Wiss. Wien. 94, p. 116.
Near El Obeid, Kordofan, Sudan.

2. DESMODILLISCUS BRAUERI BUCHANANI, Thomas & Hinton
1920. Nov. Zool. XXVII, p. 317.
Farniso, near Kano, N. Nigeria.

Genus 7. PACHYUROMYS, Lataste

1880. PACHYUROMYS, Lataste, Le Naturaliste, Paris, I, p. 313.

TYPE SPECIES.—*Pachyuromys duprasi*, Lataste.

RANGE.—North Africa: Algerian Sahara, and Western Lower Egypt.

NUMBER OF FORMS.—Three.

CHARACTERS.—Bullae and mastoids extremely and abnormally enlarged, projecting far behind the foramen magnum, and profoundly modifying the aspect of the skull. Suprameatal triangle very large. The bullae are developing in a similar manner to those of the North American Heteromyine genus *Microdipodops*, though less extreme than in that genus. Their apices are not in contact behind the palate. Supraorbital ridges developed. Zygomatic plate and infraorbital foramen about as in *Gerbillus*. Paroccipital process relatively large, closely applied to the bullae. Basioccipital much narrowed. Anterior palatal foramina well open, and the posterior pair considerably broadened.

Upper cheekteeth in adult more or less prismatic, but as in *Gerbillus* in pattern when cut; upper incisors grooved; lower molars as in *Gerbillus*. Mandible of the usual type for this subfamily.

Build rather heavy. Fur very soft. Tail uniformly haired, thickened and club-shaped. Hindfoot with four nearly subequal digits, and reduced hallux; the digits heavily haired, the posterior part of the sole naked. Foreclaws relatively well developed. Tail less than 40 per cent of head and body length in the few examples seen which bear measurements. Hindfoot about 17 per cent of head and body length only. Head and body about 120–134.

Remarks.—One of the most specialized and distinct genera in the subfamily. Forms seen: *duprasi*, *faroulti*, *natronensis*.

List of Named Forms

1. PACHYUROMYS DUPRASI DUPRASI, Lataste

1880. Le Naturaliste, Paris, I, p. 314.
Laghouat, Algerian Sahara.

2. PACHYUROMYS DUPRASI FAROULTI, Thomas

1920. Nov. Zool. XXVII, p. 313.
Mecheria, plateau of W. Algeria.

3. PACHYUROMYS DUPRASI NATRONENSIS, de Winton

1903. Nov. Zool. X, p. 285.
Bir Victoria, on the way to Wadi Natron from the Nile, Egypt.

Genus 8. AMMODILLUS, Thomas

1904. Ammodillus, Thomas, Ann. Mag. Nat. Hist. 7, XIV, p. 102.

Type Species.—*Gerbillus imbellis*, de Winton.

Range.—Somaliland.

Number of Forms.—One.

Characters.—Skull broad posteriorly; supraorbital ridges thick; nasals projecting far forwards over incisors. Mastoids not appearing conspicuously in superior aspect of skull. Zygomatic plate as in *Gerbillus*. Second pair of palatal foramina almost obsolete (normal for a Murine). Palate broader anteriorly than posteriorly, the toothrows converging behind. Mandible without coronoid process, though other than this peculiarity it is about as usual. Cheekteeth (only three skulls seen) apparently more hypsodont than in *Gerbillus*, and more like those of *Meriones* in pattern. They have been well figured by Thomas, Ann. Mag. Nat. Hist. 7, XIV, 1904, p. 102. More specimens would be welcome before a definite conclusion can be reached as to which branch of the subfamily in dental characters this animal stands nearest.

Hindfoot narrow, with naked sole. Tail long, tufted terminally, but not as well haired as is usual. Foreclaws relatively well developed. Head and body about 106; tail about 136 per cent head and body length.

This genus appears to be an isolated type, differing from the other genera in the shape of the palate and the lack of the coronoid process, both specialized characters, though generalizations are shown in the comparatively poorly haired upper portion of the tail, and the naked sole. In the hinder part of the palate are a pair of conspicuous pits.

Forms seen: *imbellis*.

List of Named Forms

1. AMMODILLUS IMBELLIS, de Winton

1898. Ann. Mag. Nat. Hist. 7, I, p. 249.
Goodar, Somaliland.

Genus 9. MERIONES, Illiger

1811. Meriones, Illiger, Prodr. Syst. Mamm. p. 82.

1900. Idomeneus, Schulze, Zeitschr. Nat. Stuttgart, LXXIII, p. 201. (*Mus tamaricinus*, Pallas.)

1933. Pallasiomys, Heptner, Zeitschr. für Säugetierk. 8, p. 150. (*Gerbillus erythrourus*, Gray.)

1919. Cheliones, Thomas, Ann. Mag. Nat. Hist. 9, III, p. 265. (*Gerbillus hurrianae*, Jerdon.) Valid as a subgenus.

1937. Parameriones, Heptner, Bull. Soc. Nat. Moscou. Biol. 46, p. 190. (*Meriones persicus*, Blanford.) Valid as a subgenus.

Type Species.—*Mus tamaricinus*, Pallas (according to Lataste, Flower and Heptner).

Range.—Northern Africa, and South-western and Central Asia. South-east Russia (Caucasus, Kalmyk, Volga-Ural steppe), more or less throughout Russian Turkestan (Kazakstan area): extreme Southern Trans-baikalian region; Mongolia, Pekin, Shansi, Shensi, Chinese Turkestan; Punjab, Delhi, Baluchistan, North-west Frontier; Afghanistan, Persia; Syria, Palestine, Arabia; Egypt, Tripoli, Algeria, Morocco, the Sahara, and the Sudan.

Number of Forms.—About seventy-five.

Characters.—Skull with the usual aspect of members of the subfamily. Supraorbital ridges usually developed; sometimes weak, as in *meridianus* group, *unguiculatus*, *tamaricinus* group (including *blackleri* and allies); sometimes becoming excessively heavy, as in *rex*, and some of the larger North African forms. In *rex*, small postorbital notches are formed by them. First pair of palatal foramina long; second pair relatively short, or may be obsolete. Bullae very variable, in some forms relatively small; at maximum development, as *crassus*, etc., the mastoids show prominently in superior aspect of skull, the bullae extremely inflated; between both extremes there are many intermediates (full notes below). Upper incisors one-grooved. Zygomatic plate well ridged, but not as a rule abnormally thrown forwards above (compare *Tatera*).

Upper cheekteeth usually hypsodont, but not evergrowing (so far as known); no traces of cusps even when first cut (this character constant in specimens

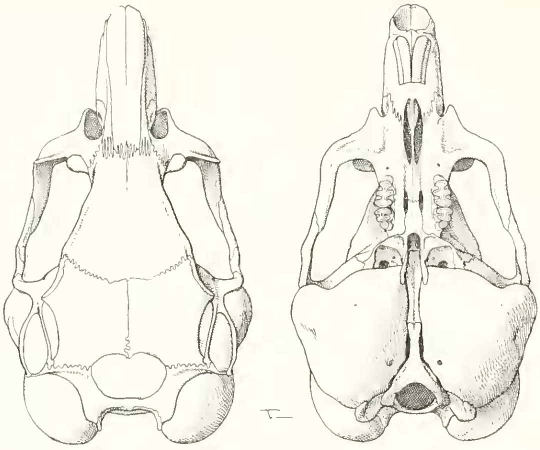

FIG. 33. MERIONES LIBYCUS CRASSUS, Sundevall.
B.M. No. 19.5.7.1, ♀; × 2 (one of the series described by Thomas as *M. pelerinus*).

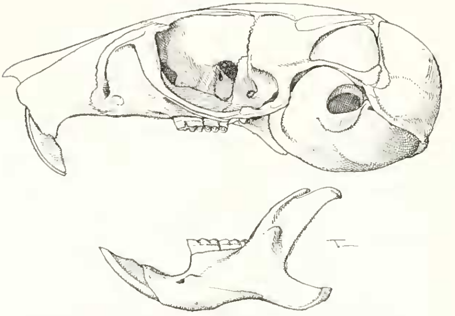

FIG. 34. MERIONES LIBYCUS CRASSUS, Sundevall.
B.M. No. 19.5.7.1, ♀; × 2.

examined, including very young forms from Africa, Arabia, Mongolia, and Central Asia). The pattern is more or less prismatic; M.1 is cut by two outer and two inner folds into three plates, the folds opposite to each other, and nearly meeting in middle of tooth; M.2 has one fold each side; M.3 simple, or very rarely with traces of an inner fold. The folds, except in extreme old age, as a rule remain open. Lower cheekteeth: three plates on M.1, two on M.2, one on M.3, the front plate on M.1 as a rule smaller than the others, the folds nearly meeting. In the very young, the teeth have an extremely hypsodont appearance, such as is seen elsewhere in genera with rootless cheekteeth.

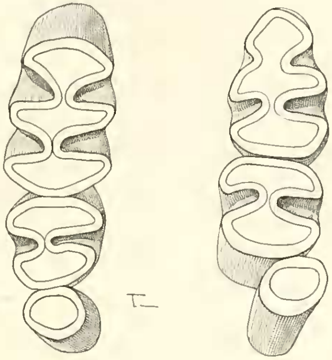

FIG. 35. MERIONES LIBYCUS CRASSUS, Sundevall.
Cheekteeth: B.M. No. 19.5.7.1, ♀; × 12.

Bullae. In *M. crassus*, and some Arabian species, as *ismahelis*, the bullae are at maximum for the genus, the mastoids appear conspicuously at back each side of skull, the bullae are extremely inflated, the suprameatal triangle is very large. In members of the *libycus-erythrourus* group, as a rule, the inflation is less extreme, and the suprameatal triangle is rather smaller; but throughout North African specimens there appears to be much individual(?) variation in the size and degree of inflation of the bullae. In some forms the bullae are not pressed against the posterior part of the zygoma (as they are normally in those above), and the suprameatal triangle may become small. In the *meridianus* group, the mastoids are weaker, but the bullae are much inflated, considerably so in front of the meatus. In *M. calurus*, the bullae are very large indeed, but the suprameatal triangle is vestigial. In *M. unguiculatus*, the bullae are moderate, being apparently intermediate in shape and size between *meridianus* group and such forms as *tamaricinus*. In *tamaricinus* the bullae are relatively smaller, and the suprameatal triangle is vestigial, so far as seen. *M. blackleri* has the smallest bullae known in the genus, except perhaps for *M. hurrianae.* In *M. persicus*, the bullae are about as in *tamaricinus*, or perhaps sometimes a little larger; the suprameatal triangle is moderate. In *M. hurrianae*, the bullae are relatively small, and the suprameatal triangle is not abnormally reduced.

These notes should show that the bullae are far too variable in this genus for any generic names to be based on their structure. Heptner in 1935 divided the genus into two, *Meriones* and "*Pallasiomys*," the latter for forms with more inflated bullae. The characters he gives are vague, and he seems to ignore the North African forms, which is just the section of the genus in which the most variability of bullae takes place. His "*Pallasiomys*" *unguiculatus* seems to be intermediate between the two types of bullae with which he characterizes his genera; certainly some of the North African forms are also intermediate between his types, and I am quite unable to tell one type of bulla structure from the other in the British Museum material. Thomas divided the North African species into groups based on bulla structure, but there appears to be too much variation for this classification to be maintained.

The following percentages, based chiefly on measurements of type skulls, indicate that in percentage of bullae against occipitonasal length there is overlapping throughout all groups in the genus:

tamaricinus-blackleri group—30, 31, 32 per cent.
persicus group—31, 33 per cent, or 37 per cent in *baptistae.*
rex group—32, 33, 34 per cent.
hurrianae group—circa 32–34 per cent.
unguiculatus group—about 37 (36–38) per cent.
meridianus group—37 (type of *auceps*) to 41 per cent.
libycus group—34 (*longiceps*), 36, 37, 38, 39, 40, 41, 42, 43 per cent, or 44, 45 per cent in *tripolius, ismahelis.*
calurus—39–40 per cent.

Normally the fur is very soft, but it becomes rather short in *unguiculatus*, and excessively short and rough in *rex* and *hurrianae.* The hindfoot is usually narrow, with proportions of digits normal; as a rule the sole is haired, in northern types completely; in some members of the *libycus* group, a certain amount of the heel is naked; in *persicus*, *rex* group, and *calurus* the sole is almost completely naked, or completely so. The *persicus* group is on this account referred in 1937 to a subgenus Parameriones by Heptner. It will have to include the *rex* group, and *calurus. Parameriones* and *Meriones* parallel *Gerbillus* and *Dipodillus*; and if *Dipodillus* is given generic rank (which I think it should not be), *Parameriones* must be also. The foreclaws are usually not enlarged, but are considerably so in *hurrianae* (being broader and larger than usual, though not extreme, compared with completely fossorial genera, as *Prometheomys*, for instance), and they are considerably enlarged in *unguiculatus*, which appears in this respect intermediate between *hurrianae* and the rest of the genus. The ear is moderate, or large; but in *hurrianae* is reduced. The tail is often subequal to head and body length, but may be considerably longer than this measurement, or may be shorter. It is always fully haired, and usually tufted terminally; in *persicus* it is extremely heavily tufted as a rule; also in *calurus*.

CHELIONES was proposed as a genus for *M. hurrianae* by Thomas, on account mainly of the heavy bowed skull, small bullae and elongated foreclaws. The foreclaws, as just described, are certainly enlarged, but *unguiculatus* also seems to have this character to a certain degree; there is some variation in *Cheliones* in the development of the claws, specimens with smaller claws being nearer *unguiculatus*; the bullae are not it seems smaller than in some *Meriones* (see percentage measurements above); the skull is certainly not highly abnormal, as it is for instance in *Brachiones*. I do not think *Cheliones* can be accepted as more than a subgenus. Its main character is I think the reduction of the ear, which is as a rule under 12 mm. (sometimes under 10), whereas in the other species it is as a rule 15 or more, though sometimes in *meridianus* group or *unguiculatus* it may be 12 or 13. The fur is unusually short and rough in *Cheliones*, but is very similar in *M. rex*.

Forms seen: *ambrosius*, *aquilo*, *arimalius*, *auceps*, *ausiensis*, *baptistae*, *blackleri*, *büchneri*, *buryi*, *calurus*, *caudatus*, *charon*, *collinus*, *crassibulla*, *crassus*, *cryptorhinus*, *edithae*, *erythrourus*, *evelynae*, "*getulus*," *grandis*, *guyoni*, *hurrianae*, *ismahelis*, "*isis*," *libycus*, *longiceps*, *longifrons*, *lycaon*, *melanurus*, *meridianus*, *pallidus*, "*pelerinus*," *persicus*, *psammophilus*, *rex*, *ricardi*, *roborovskii*, *sacramenti*, *schouesboei*, *shawi*, *swinhoei*, *syrius*, *tamaricinus*, *tripolius*, *tristrami*, *trouessarti*, *tuareg*, *unguiculatus*.

I recognize in this genus the following well-marked eight groups:

Subgenus PARAMERIONES: sole normally completely naked.

1. *calurus* group. Bullae very large (about 39–40 per cent of occipitonasal length), but suprameatal triangle vestigial. Supraorbital ridges clearly developed. Tail heavily tufted, the tuft black, bordered by two conspicuous strips of white (one each side), unique in the genus. Head and body about 127 mm.; tail rather shorter than this measurement. A rare and little known species from Sinai.
2. *persicus* group. Bullae typically small (about 31–33 per cent of occipitonasal length, but larger than this in the race *baptistae* (37 per cent)). Tail considerably longer than head and body (usually more than 120 per cent), heavily tufted terminally. Supraorbital ridges well developed. Hindfoot long, over a quarter of head and body length; ear proportionately large. Head and body about 130 mm. or more.

   Probably all named forms are races of *persicus*, though Heptner suggests *baptistae* is a distinct species. Persia, Southern Russian Turkestan, and Transcaucasia.
3. *rex* group. Bullae small (about 32–34 per cent of occipitonasal length); supraorbital ridges tending to become extremely prominent in adult; fur very short and rough (*rex*), or moderate (*buryi*); tail not heavily tufted, in *buryi* subequal to head and body, in *rex* a little longer. Head and body 160–175 mm. (as large as any member of the genus in B.M. material, though *tamaricinus* may equal it). Hindfoot shorter than *persicus*

group, less than a quarter of head and body length. Two species, *rex* and *buryi*, South Arabia.

Subgenus MERIONES: sole at least partly, often fully haired.

4. *tamaricinus* group. Bullae small (30–32 per cent of occipitonasal length), and suprameatal triangle very small. Supraorbital ridges relatively very weak, though the size is large. In *tamaricinus*, the tail is sometimes rather shorter than the head and body, and the size is in B.M. material up to 180 mm. head and body length; the tail is sharply bicolour (dark above, light below); the middle part of the sole has a noticeable patch of brown fur. In the other species referred to the group, which has usually been known as *blacklcri* (and allies), the size is rather less (about 137 or less), the tail is less sharply bicolour, and the sole is normally coloured. According to Heptner, 1937, this species should be known as *tristrami*, and include as races *blackleri*, *lycaon*, *bogdanovi*, *karjateni*, and *bodenheimeri*; I have not seen many specimens of *tristrami*, but as it appears not to agree in external characters or size with *tamaricinus* from Siberia, this classification is followed. The group ranges from Palestine, Asia Minor, Caucasus, South-east Russia, Southern Russian Turkestan, and the Gobi.
5. *libycus* group. Bullae larger than the last (34 (rarely), 36–45 per cent occipitonasal length). Sole often with bare patch on heel. Supraorbital ridges strong to extreme. Size moderate, about 120–160. Tail normally rather shorter than head and body, or subequal to it, or sometimes longer. The bullae may be moderate, and not joining zygoma, or in some forms at maximum inflation for genus, joining zygoma, and with very large mastoids, but there are intermediates between the extremes. Tail tufted.

   This group includes the North African species, most of which are listed as races of *lybicus* by G. M. Allen; one form is recognized only of this group by Flower in Egypt. Whether more than one species can be recognized on size and structure of bullae in North Africa is not clear, though some forms, as *crassus*, appear to have much larger bullae than some forms previously referred to *shawi*; *libycus* is intermediate. As well as the North African forms, I include here *erythrourus*, which has a wide range in U.S.S.R. from lower Ural River to Semirechyia, and extends to Zungaria, Syria, Afghanistan, and Central Arabia; whether *erythrourus* and its races are distinct from *libycus*, or whether they represent subspecies of *libycus*, is by no means clear. Also the group includes the Arabian species *arimalius* and *ismahelis*, with very large bullae (45 per cent of occipitonasal length in *ismahelis*), and the Persian species *charon*, which seems to have a shorter hindfoot than is usual in the genus. *M. arimalius* has an unusually long tail (about 125 per cent of head and body). Probably also *M. longifrons* belongs here.
6. *meridianus* group. Bullae large, strongly inflated (37 to 41 per cent of occipitonasal length). Supraorbital ridges weak. Tail tufted, as a rule yellow throughout (differing in this character from members of *libycus* group). Very generally smaller than in the *libycus* group (head and body

about 100–123 in B.M. material). Tail as a rule subequal in length to head and body. Sole fully haired. Probably all the named forms may be regarded as races of *meridianus*, which ranges from Caucasus, through Kazakstan to Semirechyia, Zungaria, Chinese Turkestan, Shansi, Chihli, and Mongolia.

7. *unguiculatus* group. Bullae moderate (about 36–38 per cent of occipitonasal length), less swollen anteriorly than in *meridianus*. Supraorbital ridges weak. Sole fully haired. Tail usually slightly shorter than head and body. Fur rather less soft than is normal in the genus. Foreclaws becoming large. Head and body about 105 to 117 mm. or perhaps a little more.

   One species from Mongolia, North Shansi, North Shensi, Ordos, and just extending north into Siberia.

Subgenus CHELIONES.

8. *hurrianae* group. The ear is more reduced than in other species. Supraorbital ridges developed. Bullae small, about 32–34 per cent of occipitonasal length (but larger than in some groups). Sole haired. Tail tufted, about as long as or slightly shorter than head and body. Foreclaws largest of genus. Head and body about 106–130 mm. or perhaps may be larger. Fur short and rough, about as in *M. rex*. One species, from Northern India.

LIST OF NAMED FORMS

Subgenus *Parameriones*, Heptner

calurus Group

1. MERIONES CALURUS, Thomas
1892. Ann. Mag. Nat. Hist. 6, IX, p. 76.
Sinai.

persicus Group

2. MERIONES PERSICUS PERSICUS, Blanford
1875. Ann. Mag. Nat. Hist. 4, XVI, p. 312.
Persia.

3. MERIONES PERSICUS SUSCHKINI, Kashkarov
1925. Trans. Sci. Soc. Turkestan, 2, pp. 51, 56.
Great Balhany Mountains, Turkestan.

4. MERIONES PERSICUS AMBROSIUS, Thomas
1919. Ann. Mag. Nat. Hist. 9, III, p. 270.
Ahwaz, Persia.

5. MERIONES PERSICUS ROSSICUS, Heptner
1931. Zool. Anz. 94, p. 120.
Arzni, 20 kilometres northwards from Eriwan, Transcaucasia.

6. MERIONES PERSICUS BAPTISTAE, Thomas
1920. Journ. Bombay Nat. Hist. Soc. XXVI, p. 934.
Pasht Kuh, S.-W. Baluchistan.

rex Group

7. MERIONES BURYI, Thomas

1902. Ann. Mag. Nat. Hist. 7, X, p. 488.
Zabed, Aden, S. Arabia.

8. MERIONES REX, Yerbury & Thomas

1895. Proc. Zool. Soc. London, p. 552.
Lahej, Aden, S. Arabia.

Subgenus *Meriones*, Illiger

tamaricinus Group

9. MERIONES TRISTRAMI TRISTRAMI, Thomas

1892. Ann. Mag. Nat. Hist. 6, IX, p. 148.
Dead Sea, Palestine.

10. MERIONES TRISTRAMI KARJATENI, Aharoni

1932. Zeitschr. für Säugetierk. 7, p. 200.
El Karjaten, Syrian Desert,

11. MERIONES TRISTRAMI BODENHEIMERI, Aharoni

1932. Zeitschr. für Säugetierk. 7, p. 199.
Kafrun, north of Lebanon, Palestine.

12. MERIONES TRISTRAMI BLACKLERI, Thomas

1903. Ann. Mag. Nat. Hist. 7, XII, p. 189.
Smyrna, Asia Minor.

13. MERIONES TRISTRAMI LYCAON, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 272.
Lycaonia, Asia Minor.

14. MERIONES TRISTRAMI INTRAPONTICUS, Neuhäuser

1936. Zeitschr. für Säugetierk. 11, p. 159.
Tosya, Vilayet Kastamonu, Asia Minor.

15. MERIONES TRISTRAMI BOGDANOVI, Heptner

1931. Zool. Anz. 94, p. 121.
Milskaja-Steppe, Saljanj District, Pirchin-tapa Hill, Transcaucasia.

16. MERIONES TAMARICINUS TAMARICINUS, Pallas

1778. Nov. Sp. Quad. Glir. Ord. p. 322.
Saraitschikovsk, near mouth of Ural River.

17. MERIONES TAMARICINUS CISCAUCASICUS, Satunin

1907. Mitt. Kaukas. Mus. 3, pp. 20, 63.
N.-E. Caucasus.

18. MERIONES TAMARICINUS JAXARTENSIS, Ognev & Heptner

1928. Zool. Anz. 75, p. 264.
St. Kara Usiak der Orenberg-Tashkent-Bahn, Perovsky-Bezirk, Syr-Darjinsky District, Turkestan.

19. MERIONES TAMARICINUS KOKANDICUS, Heptner

1933. Zeitschr. für Säugetierk, 8, p. 152.
Kokand, Fergana, Russian Turkestan.

20. MERIONES TAMARICINUS SATSCHOUENSIS, Satunin

1903. Ann. Mus. St. Petersb. VII, p. 555.
Oase Sa-tschou, Gobi, Central Asia.

libycus Group

21. MERIONES LIBYCUS LIBYCUS, Lichtenstein

1823. Doubletten des Berliner Museums, p. 5, no. 9.
Egypt, probably Alexandria.
Synonym: *sellysii*, Pomel, Comp. Rend. Acad. Sci. Paris, 42, 654, 1856.
melanurus, Rüppell, 1842, Mus. Senckenb. III, p. 95.
isis, Thomas, 1919, Ann. Mag. Nat. Hist. 9, III, p. 271.
shawi, Rozet, 1833, Voy. Reg. Alger. I, p. 243. Algeria. (Status *fide* G. M. Allen.)
richardi, Loche, 1867, Expl. Alg. Mamm. p. 104. Boghar, Algerian Plateau.

22. MERIONES LIBYCUS CONFALONIERI, de Beaux

1932. Ann. Mus. Civ. Stor. Nat. Genova, LV, p. 384.
El Agheila, Libyan Desert, near Oasis of Cufra, Libya.

23. MERIONES LIBYCUS CAUDATUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 267.
Ferdjan, Tripoli.

24. MERIONES LIBYCUS LONGICEPS, Lataste

1885. Act. Soc. Linn. Bordeaux, XXXIX, p. 267.
Tunis.

25. MERIONES LIBYCUS LATICEPS, Lataste

1887. Explor. Sci. de Tunisie, Cat. Critique de Mamm. p. 27.
Constantine, Algeria.

26. MERIONES LIBYCUS ALBIPES, Lataste

1882. Le Naturaliste, Paris, II, p. 101.
Msila, Plateau of Algeria.

27. MERIONES LIBYCUS AUSIENSIS, Lataste

1882. Le Naturaliste, Paris, II, p. 77.
Borders of Oued Akarit, between Aumale and Oud Okris, Algeria.

28. MERIONES LIBYCUS CRASSIBULLA, Lataste

1885. Act. Soc. Linn. Bordeaux, XXXIX, p. 267.
Tabessa, Tamesmida and Tafferma, Tunis.

29. MERIONES LIBYCUS GUYONI, Loche

1867. Expl. Alg. p. 103.
Ain-el-Atrech, S. Algerian Sahara.

30. MERIONES LIBYCUS SACRAMENTI, Thomas

1922. Ann. Mag. Nat. Hist. 9, X, p. 552.
Beersheba, Palestine.

31. MERIONES LIBYCUS CRASSUS, Sundevall

1842. K. Svenska Vetensk. Akad. Handl. Stockholm, p. 233, pl. 11, fig. 4
Sinai.
Synonym: *pelerinus*, Thomas, 1919, Ann. Mag. Nat. Hist. 9, III, p. 266. Tebuk, Hedjaz Railway, N.-W. Arabia.

32. MERIONES LIBYCUS PALLIDUS, Bonhote

1912. Abstr. Proc. Zool. Soc. London, p. 3; Proc. Zool. Soc. London, p. 226.
Atbara, Sudan.

33. MERIONES LIBYCUS TRIPOLIUS, Thomas

1919. Ann. Mag. Nat. Hist. 9, III, p. 265.
Gebel Limhersuk, N.-W. Tripoli.

34. MERIONES SCHOUESBOEI SCHOUESBOEI, Loche

1858. Cat. Mamm. & Oiseaux de l'Algerie, p. 23.
Ras-Nili, Algerian Sahara.
Synonym: *gaetulus*, Lataste, 1882, Le Naturaliste, Paris, II, p. 83.
renaultii, Loche, 1867, Exp. Sci. Alg. Zool. Mamm. 106.

35. MERIONES SCHOUESBOEI TUAREG, Thomas

1925. Ann. Mag. Nat. Hist. 9, XVI, p. 193.
Teguida, Asben, Sahara.

36. MERIONES GRANDIS, Cabrera

1907. Bol. Real. Soc. Esp. Hist. Nat. p. 175.
Marrakesh, Central Morocco.

37. MERIONES TROUESSARTI, Lataste

1882. Le Naturaliste, Paris, II, p. 69.
Bou-Saada, Algeria (near Msila).

38. MERIONES ERYTHROURUS ERYTHROURUS, Gray

1842. Ann. Mag. Nat. Hist. X, p. 266.
Sahlabad, about 12 miles S.-W. of Khandahar, Afghanistan.
(Probably this species and its races should be listed as races of *M. libycus*.)

39. MERIONES ERYTHROURUS SWINHOEI, Scully

1881. Ann. Mag. Nat. Hist. 5, VIII, p. 228.
Gatai, Afghanistan.

40. MERIONES ERYTHROURUS AQUILO, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 395.
Gu-tschen, Dzungaria.

41. MERIONES ERYTHROURUS MAXERATIS, Heptner

1933. Zeitschr. für Säugetierk. 8, p. 152.
Kurota-Cleft, in neighbourhood of Tschakan-kala, on river Tschandyr, Kopet-Dag, Transcaspia.

42. MERIONES ERYTHROURUS MARGINIAE, Heptner

1933. Zeitschr. für Säugetierk. 8, p. 153.
Bairam-Ali, Merv-Oase, Transcaspia.

43. MERIONES ERYTHROURUS OXIANUS, Heptner

1933. Zeitschr. für Säugetierk. 8, p. 153.
Gusar, south from Karschi, Buchara, Russian Turkestan.

44. MERIONES ERYTHROURUS SOGDIANUS, Heptner

1933. Zeitschr. für Säugetierk. 8, p. 153.
Mirsa-Aral, on left side of bank of Syr-Darya, 35 kilometres north-north-east of Kokand, Fergana Valley, Turkestan.

45. MERIONES ERYTHROURUS LEGERI, Aharoni

1932. Zeitschr. für Säugetierk. 7, p. 202.
Wadi Abjad, south-west of Beersheba, Palestine.

46. MERIONES ERYTHROURUS EVERSMANNI, Bogdanov
1875. Trudy St. Petersb. Nat. Ges. 6, p. 266.
Mangyshlak Peninsula, east coast Caspian Sea.

47. MERIONES ERYTHROURUS SYRIUS, Thomas
1919. Ann. Mag. Nat. Hist. 9, III, p. 268.
Karyatein, Syrian Desert.

48. MERIONES ERYTHROURUS EDITHAE, Cheesman & Hinton
1924. Ann. Mag. Nat. Hist. 9, XIV, p. 555.
Hufuf, Central Arabia.

49. MERIONES ERYTHROURUS EVELYNAE, Cheesman & Hinton
1924. Ann. Mag. Nat. Hist. 9, XIV, p. 555.
Hufuf, Central Arabia.

50. MERIONES ERYTHROURUS CRYPTORHINUS, Blanford
1875. Journ. Asiat. Soc. Bengal, XLIV, 2, p. 108.
E. Turkestan.

51. MERIONES ERYTHROURUS (?) CAUCASICUS, Brandt
1855. Mél. Biol. Acad. St. Petersb. II, p. 303.
Transcaucasia.
(Vinogradov suggests this form is a race of *erythrourus*.)

52. MERIONES KOZLOVI, Satunin
1903. Ann. Mus. St. Petersb. VII, p. 553.
Gobi-Altai, Central Asia.

53. MERIONES LONGIFRONS, Lataste
1884. Proc. Zool. Soc. London, p. 88.
Jedda, Arabia.

54. MERIONES ISMAHELIS, Cheesman & Hinton
1924. Ann. Mag. Nat. Hist. 9, XIV, p. 553.
Hufuf, Central Arabia.

55. MERIONES ARIMALIUS, Cheesman & Hinton
1924. Ann. Mag. Nat. Hist. 9, XIV, p. 554.
Jabrin, Central Arabia.

56. MERIONES CHARON, Thomas
1919. Ann. Mag. Nat. Hist. 9, III, p. 269.
Ahwaz, Persia.

meridianus Group

57. MERIONES MERIDIANUS MERIDIANUS, Pallas
1773. Reise, II, p. 702.
"Desert of Lake Caspian."
Synonym: *longipes*, Pallas, 1778, Nov. Sp. Quad. Glir. Ord. p. 88.
fulvus, Eversmann, 1848, Bull. Nat. Moscou, XXI, p. 195.
brevicaudatus, Milne-Edwards, 1867, Ann. Sci. Nat. VII, p. 377.

58. MERIONES MERIDIANUS ROBOROWSKII, Büchner
1888. Wiss. Res. Przwalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 63.
Zaidam, Central Asia.

59. MERIONES MERIDIANUS AUCEPS, Thomas

1908. Proc. Zool. Soc. London, p. 640.
Tai Yuen Fu, Shansi, China.

60. MERIONES MERIDIANUS PSAMMOPHILUS, Milne-Edwards

1868. Rech. Mamm. p. 144.
Suen-hoa-fu, province of Pekin, China; south of Kalgan.

61. MERIONES MERIDIANUS BÜCHNERI, Thomas

1909. Ann. Mag. Nat. Hist. 8, III, p. 262.
Deleun Mountains, Dzungaria.

62. MERIONES MERIDIANUS PENICILLIGER, Heptner

1933. Zeitschr. für Säugetierk. 8, p. 154.
Repetek Station of Middle Asiatic Railway, Kara-Kum Desert, Transcaspia.

63. MERIONES MERIDIANUS SHITKOVI, Heptner

1933. Zeitschr. für Säugetierk. 8, p. 154.
Mirsa-Aral, on left bank of Syr-Darya, 35 kilometres north-north-east of Kokand, Fergana Valley, Turkestan.

64. MERIONES MERIDIANUS MASSAGETES, Heptner

1933. Zeitschr. für Säugetierk. 8, p. 155.
Town Aralskaje, on north-east coast of Lake Aral, Turkestan.

65. MERIONES MERIDIANUS KARELINI, Kolossow

1935. Bull. Soc. Nat. Moscou, Biol. 44, p. 381.
North-east coast of Caspian Sea.

66. MERIONES MERIDIANUS NOGAIORUM, Heptner

1927. Mat. contr. faun. L. Volga, 1, p. 32.
Between Terek River and Caucasus.
Synonym: *meridianus nogaiorum litoralis*, Heptner, 1927, Orlov & Feniuk, Mat. contr. faun. L. Volga, 1, p. 71. Kalmyk Province, S.-E. Russia.

unguiculatus Group

67. MERIONES UNGUICULATUS, Milne-Edwards

1867. Ann. Sci. Nat. Zool. VII, p. 377.
Mongolia.

Subgenus *Cheliones*, Thomas

68. MERIONES HURRIANAE HURRIANAE, Jerdon

1867. Mamm. India, p. 186.
Hurriana, Punjab.

69. MERIONES HURRIANAE COLLINUS, Thomas

1919. Journ. Bombay Nat. Hist. Soc. XXVI, p. 726.
Kohat, N.-W. Frontier Province, India.

Species not seen and not allocated to Groups

70. MERIONES MARIAE, Cabrera

1907. Bol. Real. Soc. Esp. Hist. Nat. p. 177.
Cabo Juby, coast of Moroccan Sahara.

71. MERIONES LEPTURUS, Büchner

1888. Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 67.
Chotan-darja, near the river, Takla-Makan Desert, Turkestan.

72. MERIONES VINOGRADOVI, Heptner

1931. Zool. Anz. 94, p. 122.
Aserbeidschan, Iran (= Persia).

73. MERIONES KURAUCHII, Mori

1930. Annot. Zool. Jap. 12, p. 417.
Central Manchuria.

74. MERIONES COLLIUM, Severtzow

1876. Ann. Mag. Nat. Hist. XVIII, p. 55.
Turkestan.

75. MERIONES URIANCHAICUS, Vinogradov

1927. Small Mammals Minussinsk District & Urjankhai, p. 41.
Ikiottuk, Uriankhai, Mongolia.
(Described as near *meridianus*.)

The *Meriones lacernatus* of Rüppell, 1842, Mus. Senck. III, p. 96, pl. vi, fig. 1, is probably based on an *Arvicanthis*. (Lake Tana, Abyssinia.)

Genus 10. PSAMMOMYS, Cretzchmar

1828. PSAMMOMYS, Cretzchmar, Rüppell Atlas, p. 56.

TYPE SPECIES.—*Psammomys obesus*, Cretzchmar.

RANGE.—Palestine and Northern Africa; Egypt, Tripoli, Tunis, Algeria; (?)Sudan; Arabia.

NUMBER OF FORMS.—Eight.

CHARACTERS.—Skull like that of larger species of *Meriones*, though inclined to be narrower between the orbits, perhaps; supraorbital ridges typically very strong, forming small postorbital notches. Mastoids showing prominently each side at the back of the skull, the meatus and suprameatal triangle large; the bullae well inflated, the mastoids moderately so; the bullae are inflated in front of the meatus. Zygomatic plate normal. Occipital region usually upstanding, well ridged. Anterior palatal foramina narrow, slitlike; posterior pair usually much reduced. Upper incisors plain. Cheekteeth strongly hypsodont, but not evergrowing; their pattern like that of *Meriones*. Mandible with angular portion usually inflected.

External form heavy; tail fully haired, and tufted; sole moderately haired as a rule; tail relatively shorter than is usual in *Meriones*; ear rather small.

The tail averages rather less than 80 per cent of the head and body length, in the British Museum series (covering all species). The hindfoot is proportionately rather short (on average about 21 per cent of head and body length).

It appears from British Museum material that there are two species of *Psammomys*, a larger one and a smaller one. Thomas, 1925, states that the form *roudairei*, which name was formerly used for the smaller one, is a synonym or race of *obesus*, and names the smaller one *vexillaris*. The head and body may be over 180 mm. in *obesus*.

Forms seen: *algiricus*, *edusa*, *nicolli*, *obesus*, *roudairei*, *tripolitanus*, *terraesanctae*, *vexillaris*.

List of Named Forms

1. PSAMMOMYS OBESUS OBESUS, Cretzchmar

1828. Rüppell Atlas, p. 58, pl. 22.
Near Alexandria, Egypt.
Synonym: *elegans*, Heuglin, 1877, Reise N. Ost. Africa, ii, p. 80. Suakin, Anglo-Egyptian Sudan.

2. PSAMMOMYS OBESUS NICOLLI, Thomas

1908. Ann. Mag. Nat. Hist. 8, II, p. 92.
Damietta, N. Egypt.

3. PSAMMOMYS OBESUS TRIPOLITANUS, Thomas

1902. Proc. Zool. Soc. London, p. 9.
Boucheifa, coast of Tripoli.

4. PSAMMOMYS OBESUS TERRAESANCTAE, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 363.
Dead Sea, Palestine.

5. PSAMMOMYS OBESUS ALGERICUS, Thomas

1902. Ann. Mag. Nat. Hist. 7, IX, p. 363.
Biskra, Algeria.

6. PSAMMOMYS OBESUS ROUDAIREI, Lataste

1881. Le Naturaliste, Paris, I, p. 492.
Msila and l'Oued Magra, north of Chott du Hodna; also Tibrent, between Mzale and Laghouat, Algeria.

7. PSAMMOMYS VEXILLARIS VEXILLARIS, Thomas

1925. Ann. Mag. Nat. Hist. 9, XVI, p. 198.
Bondjem, Tripoli.

8. PSAMMOMYS VEXILLARIS EDUSA, Thomas

1925. Ann. Mag. Nat. Hist. 9, XVI, p. 199.
Mil Manases, Chegga, just south of Biskra, Algeria.

The genus is not sharply separable from *Meriones*, but may stand on the character of the plain incisors. It may be noted that the cheekteeth in *Psammomys* are strongly hypsodont, and that the skull is as a rule more angular than the majority of *Meriones*.

Genus 11. BRACHIONES, Thomas

1925. Brachiones, Thomas, Ann. Mag. Nat. Hist. 9, XVI, p. 548.

Type Species.—*Gerbillus przewalskii*, Büchner.

Range.—China: Eastern Turkestan, and Gobi Desert.

Number of Forms.—Three.

Characters.—Skull with almost triangular appearance owing to immensely wide frontals, and strongly shortened and reduced rostrum.

Almost no interorbital constriction present; back of skull very wide. Zygomatic plate normal. Mastoids not appearing in superior aspect of skull, but bullae very large. Suprameatal triangle vestigial. Anterior palatal foramina in the three skulls examined shortened, in front of toothrow; posterior pair appearing as very small pits only. Grooving of incisors, and cheekteeth as in *Meriones*; the upper incisors are inclined to be slightly pro-odont.

Externally small (smaller than any *Meriones* I have seen); thickset; tail probably shorter than head and body, heavily haired; ear small; foreclaws prominent; sole of hindfoot completely haired.

The extraordinary appearance of the skull is, I think, of sufficient importance to retain this genus distinct from *Meriones*. The bullae are about 40 per cent of occipitonasal length in two measured.

Forms seen: *przewalskii*.

List of Named Forms

1. BRACHIONES PRZEWALSKII PRZEWALSKII, Büchner

1889. Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 51.
Lob Nor, Central Asia.

2. BRACHIONES PRZEWALSKII CALLICHROUS, Heptner

1934. Arch. Mus. Zool. Moscou, 1, p. 8.
Lower part of valley of River Ezin-Gol, Lake Sogo-nor, W. Gobi Desert.

3. BRACHIONES ARENICOLOR, Miller

1900. Proc. Biol. Soc. Washington, XIII, p. 163.
In jungle on Yarkand River, east of Maralbashi, E. Turkestan.

Genus 12. RHOMBOMYS, Wagner

1841. Rhombomys, Wagner, Gel. Anz. K. Bayer. Akad. Wiss. München, XII, 52, p. 421.

Type Species.—*Rhombomys pallidus*, Wagner.

Range.—Palaearctic: Russian Turkestan, west to Ural River and Caspian Sea, east to Semirechyia; south to Fergana; also ranges to Dzungaria, Chinese Turkestan, and Mongolia.

Number of Forms.—Seven.

Characters.—Cheekteeth evergrowing. Rostrum and nasals rather short and broad, as compared with *Meriones*. Zygomatic plate projected well forwards, though not so extremely as *Tatera*. Supraorbital ridges well developed, sometimes forming small postorbital-like process. Second pair of palatal foramina obsolete or much reduced; anterior pair slit-like, narrow. Occipital region strong. Upper cheekteeth rootless, like those of *Meriones* in appearance, but with the folds tending to be much less open, and more filled up, so that the pattern is simpler. M.3 may retain the posterior heel, or this may be absent. Lower molars with folds usually more or less closed; M.3 simple. The bullae are moderately inflated.

Fur very thick and soft; form heavy; tail very hairy, almost bushy, rather shorter than head and body; ear strongly reduced; claws large; sole heavily haired. Large; head and body up to 200 mm. in those seen. There was some doubt about the validity of this genus, but Heptner's paper showing that it has rootless cheekteeth (which is clear in the few examined in this character in London) removes all doubt. The upper incisors have two grooves, the inner one internal and vestigial.

Forms seen: *giganteus*, *opimus*.

List of Named Forms

1. RHOMBOMYS OPIMUS OPIMUS, Lichtenstein

1823. Eversmann. Reise Buchara, p. 122.
Between Orenburg and Bokhara, U.S.S.R.
Synonym: *pallidus*, Wagner, 1841, Münch. Gel. Anz. XII, no. 54, p. 432.

2. RHOMBOMYS OPIMUS DALVERSINICUS, Kashkaroff

1926. Key to Rodents of Turkestan, p. 25 (publ. Usbekistan Exp. Stat. Plant Prot.).
Dalversinskaia Steppe, S.-E. Russia.

3. RHOMBOMYS OPIMUS FUMICOLA, Heptner

1933. Zeitschr. für Säugetierk. 8, p. 152.
Kokand, Fergana, Russian Turkestan.

4. RHOMBOMYS OPIMUS TURFANENSIS, Satunin

1903. Ann. Mus. Zool. St. Petersb. VII (1902), p. 557.
Turfan, S.-E. Tian-Shan.

5. RHOMBOMYS OPIMUS GIGANTEUS, Buchner

1888. Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 73.
Ebi Nor, Dzungaria, Central Asia.

6. RHOMBOMYS OPIMUS NIGRESCENS, Satunin

1903. Ann. Mus. Zool. St. Petersb. VII (1902), p. 560.
Lake Orok-Nor, Gobi-Altai.

7. RHOMBOMYS OPIMUS ALASCHANICUS, Matschie

1911. Säugethiere, in Futterer Durch Asien, Bd. III, p. 12.
Alashan, Central Asia.

I have no notes on the fossil history of the subfamily.

GERBILLINAE:

SPECIAL WORKS OF REFERENCE

Lataste, 1882, Le Naturaliste, Paris, p. 27.
Heptner, Numerous papers in recent years on Siberian genera, *Rhombomys*, *Meriones*, etc.
Vinogradov, Rodents of U.S.S.R., 1933. Key to species in U.S.S.R.
Shortridge, Mammals of South-west Africa, Heinemann, 1934.
St. Leger, Key to Families and Genera of African Rodents, Proc. Zool. Soc. London, p. 964, 1931.
Hollister, Bull. U.S. Nat. Mus. 99, p. 25, 1919.
Wroughton, 1906, Ann. Mag. Nat. Hist. 7, XVII, p. 474; key to forms of *Tatera*.

Subfamily MYOSPALACINAE

1896. Thomas: Muridae, Siphneinae (=Myospalacinae).
1899. Tullberg; Spalacidae, part.
1918. Miller & Gidley: Spalacidae, part, subfamily Myospalacinae.
1924. Winge: Muridae, Cricetini, part, Criceti, part.
1928. Weber: Spalacidae, part.

Geographical Distribution.—Palaearctic: Central and Northern China, and Central and Eastern Siberia.

Number of Genera.—One.

Characters.—Cheekteeth evergrowing, prismatic in pattern (parallel—Microtinae). Skull modified for subfossorial life; occipital region slanting forwards to level of posterior zygomatic root; a weak squamosal crest developed; zygomatic plate moderately broad; infraorbital foramen large, and nearly triangular (thus totally different from the form found in Microtinae). Externally modified for underground life; eyes small but retained (compare Spalacidae); foreclaws enormously developed.

Genus 1. MYOSPALAX, Laxmann

1769. Myospalax, Laxmann, Sibirische Briefe, p. 75.
1792. Myotalpa, Kerr, Anim. Kingd. I, Mamm. Syst. Cat. Nos. 516, 517, 520. (*Mus aspalax*, Pallas.)
1827. Siphneus, Brants, Het geslacht d. Muizen, pp. 19–23. (*Mus aspalax*, Pallas.)
Zokor, new (below). (Type: *Siphneus fontanieri*, Milne-Edwards.) Valid as a subgenus.

Type Species.—*Mus myospalax*, Laxmann.

Range.—As in the subfamily. In U.S.S.R., occurring in Transbaikal area (*M. dybowskii*), Altai, and steppe adjoining the Altai Mountains (*M. myospalax*), and South-eastern Transbaikalia, Amur, and Southern Ussuri area (*M. psilurus*). In China, known from Manchuria, Chihli, Shensi, Shansi, Kansu, Lake Kukunor, West Szechuan, and Mongolia.

Number of Forms.—About nineteen.

Characters.—Skull with moderately constricted frontals; a weak squamosal crest present in adult; supraorbital ridges well marked in adult, but parallel, showing no signs of joining except in the only two skulls seen of *M. smithi*. A very strong ridge at right angles to supraorbital ridges forming forepart of occipital region runs across the back of the skull, about on a level with posterior zygomatic root. The occipital region is narrow and stands somewhat behind these ridges in many Chinese species (*fontanieri* and *smithi* groups), but in *myospalax*, *armandi*, and *psilurus*, this region of the skull is higher, broader, and flatter, more like that of *Spalax*. Rostrum thick and prominent. Bullae large. Palate narrow, terminating at level of front part of M.3, often with spinous process. Pterygoid fossae deep. Incisive foramina small, but less reduced than is usual in underground forms. Jugal relatively long. Zygomatic plate strong, moderately broad, though little tilted upwards

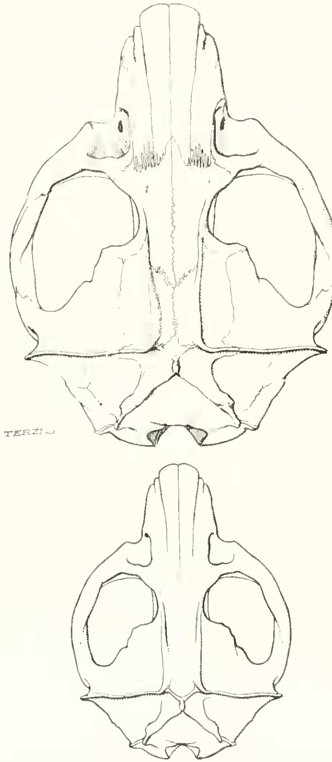

FIG. 36. MYOSPALAX FONTANIERI FONTANUS, Thomas.
B.M. No. 9.1.1.203, Shansi; small figure natural size.

owing to general forward and downward slope of the skull. Infraorbital foramen large, wider above than below, more or less triangular.

The infraorbital foramen is very different from that of *Spalax*. Upper incisors broad. Cheekteeth evergrowing (other than the Microtinae, this genus is, as far as known, the only member of the Muridae with this specialization except

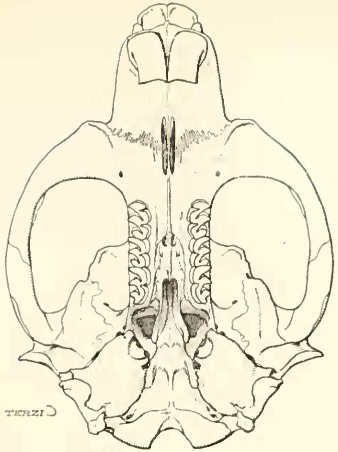

FIG. 37. MYOSPALAX FONTANIERI FONTANUS, Thomas,
B.M. No. 9.1.1.203; × 1½.

FIG. 38. MYOSPALAX FONTANIERI FONTANUS, Thomas.
B.M. No. 9.1.1.203; × 1½.
(Figs. 36–38 from Hinton, Monograph of the Voles and Lemmings, vol. 1, pp. 27–29.)

Rhombomys (Gerbillinae)). The outer side of each upper molar with two wide long folds cutting the tooth into three external projections; the inner side with one shallow fold; also in M.1 there is often a small extra anterior inner fold.

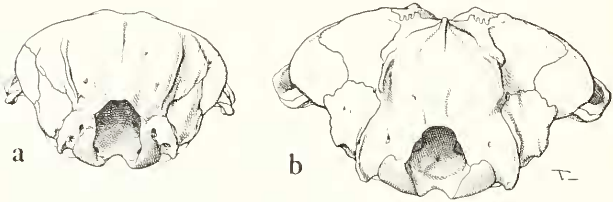

FIG. 39. Posterior views of skull of *a*. MYOSPALAX PSILURUS, Milne-Edwards (subgenus *Myospalax*) and *b*. MYOSPALAX FONTANIERI FONTANUS, Thomas (subgenus *Zokor*). × 1½.

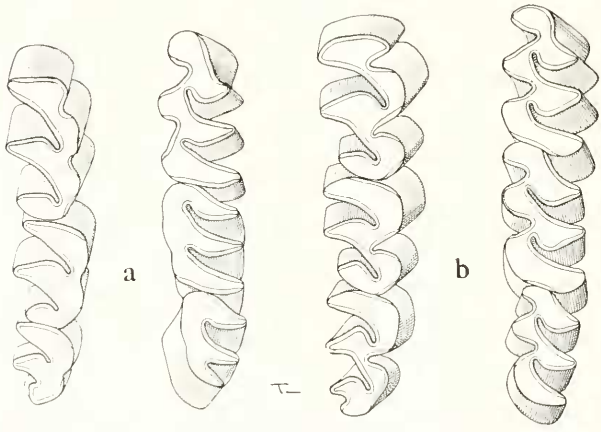

FIG. 40*a*. MYOSPALAX PSILURUS, Milne-Edwards; *b*. MYOSPALAX FONTANIERI FONTANUS, Thomas.

Cheekteeth: B.M. Nos. 28.6.19.56, ♂, and 9.1.1.202; × 7.

M.1 little larger than M.2. M.3 may have a small extra posterointernal fold; or a small posteroexternal one. In the *myospalax* group, the inner folds are obsolete. *M. armandi* and, as figured by Vinogradov, *M. dybowski*, has a small reduced simplified M.3. Lower cheekteeth: with a posterior loop, two alternating closed triangles, and an anterior loop which often has an extra inner fold in M.1, in more complex-toothed species (i.e. other than *myospalax* group) (I have not seen the lower molars of *armandi*); in *myospalax*, there are no closed triangles, these meeting to form a transverse loop. *M. psilurus* has M.3 lower reduced (more so than in other species), and simplified; consisting of an anterior loop, a small closed triangle, and a posterior loop with a small inner re-entrant fold. Mandible with no process formed by lower incisor root. The angular portion is broad, and the coronoid high.

Fur soft. Eyes and ears minute. Tail short, but longer than hindfoot as a rule; moderately or poorly haired. Foreclaws of three central digits of manus extremely enlarged; D.3 slightly longer than D.2 and D.4; D.5 with a short claw; pollex very short, but with small claw. The claw of D.2 often is thinner than that of D.3 and D.4. Hindfoot with large claws, but not comparable in size to those of forefoot; D.3 and D.4 longer than D.2, which is longer than hallux; hallux longer than D.5, which is extremely reduced.

Remarks.—Though sometimes placed in the family Spalacidae, I think there is no reasonable doubt that this genus represents a highly specialized member of the Muridae. Its relationships appears to be more with the Cricetinae and Microtinae than elsewhere. The teeth present a number of resemblances to the members of the latter subfamily; Hinton (Monograph of Voles and Lemmings) states: "In the remarkable Asiatic genus *Myospalax*, the cheekteeth are rootless and closely resemble in pattern those of the typical Lemmings among the Microtinae. But although the skull is highly specialized for fossorial habits, it and the jaw muscles resemble those of the Cricetinae in retaining essential features similar to those found in the more primitive of the non-Microtine Muridae generally and differing widely from those characteristic of the Microtinae." Among these may be at once mentioned the formation of the infraorbital foramen. Partly on the shape of this, the genus was transferred to the Spalacidae by Miller & Gidley. But the infraorbital foramen and zygomatic plate of this genus seem to me to be widely different from those of *Spalax*; while the teeth of *Myospalax* are not unlike those found within the Muridae, but are totally different from those of *Spalax*. The relationship between *Myospalax* and *Spalax* might indeed be compared to that existing between *Cavia* and *Dasyprocta*; both with many similar external specializations no doubt brought about by mode of life; but both with widely different dental pattern, and considerably different zygomasseteric structure.

Various allied fossil forms have been described from Eastern Asia.

Forms seen: *aspalax*, *armandi*, *baileyi*, *cansus*, *epsilanus*, *fontanus*, *myospalax*, *psilurus*, *rothschildi*, *smithi*, *shanseius*.

Five quite distinct specific groups appear to me to be contained in the material examined. Their characters are as follow:

Firstly, the species may be divided into two sections which are of subgeneric rank, based on the structure of the occipital region of the skull. In the more primitive species, which have a lower occipital region, and usually more complex, less reduced teeth, the occipital region has the outer sides bent forwards, and the lambdoid crest does not extend right across the back of the skull.

The *fontanieri* group, containing *fontanieri* (of which *fontanus* seems to be not more than a subspecies), *baileyi* (also not very clearly distinct from *fontanieri*), *cansus*, and *rothschildi*, is confined to the Western and Central Chinese parts of the range of the genus, and is typical of this section of the genus. The molars show no signs of reduction or simplification.

The *smithi* group contains only *smithi* from Kansu, differing from all other members of the genus (examined) in the fusion of the supraorbital ridges. Dentally it is like *rothschildi*.

In the other groups, the occipital region is flatter, broader, and higher; the outer sides are not bent forward; the lambdoid crest extends right across the back of the skull. Usually there is some dental reduction taking place.

The *psilurus* group, containing only *psilurus*, with *epsilanus* as a race, from Manchuria, Chihli, and Transbaikalia, is the most complex-toothed of this section of the genus. The inner folds of the upper molars are well marked. But the third lower molar is more strongly reduced than in other species of the genus, as described above.

The *myospalax* group, containing *myospalax* and, if the London material is correctly identified, *aspalax* which seems to be a subspecies only, differs from the last in the rather larger third lower molar, and in having the inner folds of the upper molars for the most part obsolete; also apparently there are no closed triangles in the lower molars. (Altai region, Siberia.)

The *armandi* group (of which I have seen only one skull) differs from the above in the strong reduction and simplification of M.3 (upper). It contains *armandi* from Mongolia, and according to Vinogradov's figure, *dybowski* from Irkutsk.

The cranial distinctions between the *fontaineri-smithi* division and the *myospalax-psilurus-armandi* division of the genus are in my opinion of subgeneric value. The two types show no sign, in B.M. material, of any intermediate forms; and the geographical range of each division is apparently quite separate, the *myospalax* division being restricted to Siberian Altai, Mongolia, Manchuria, and Eastern Siberia, and the *fontanieri* division being more southern in range, Kansu, Shansi, Shensi, Kukunor, and West Szechuan.

Unfortunately neither the names *Myotalpa* nor *Siphneus* are available, both being based on *aspalax*, which is a race or synonym of the type species, *myospalax*; therefore I propose the name Zokor as a subgenus for the *fontanieri-smithi* division of the genus, type—*Siphneus fontanieri*, Milne-Edwards. The two groups are just as distinct as are the subgenera *Spalax* and *Mesospalax* of the genus *Spalax*, on cranial characters. Of the forms not represented in London, and not allocated to groups, *minor* (Kansu), *kukunoriensis* (Lake Kukunor), and *rufescens* (Shensi), are described as nearest *rothschildi*, *baileyi*, and *cansus* respectively, and therefore would, as might be expected, belong to *Zokor*; while *komurai*, from Manchuria, is described as near *armandi*, and would therefore be *Myospalax* s.s.

Excellent figures of the main species of this genus will be found in Milne-Edwards, 1874, Rech. Mamm.

List of Named Forms

(References and type localities the work of Mr. R. W. Hayman.)

Subgenus *Zokor*, Ellerman

fontanieri Group

1. MYOSPALAX FONTANIERI FONTANIERI, Milne-Edwards

1867. Ann. Sc. Nat. VII, p. 376.
Kansu, China.

2. MYOSPALAX FONTANIERI FONTANUS, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 93.
Ning-wu-fu, Central Shansi, China.

3. MYOSPALAX BAILEYI, Thomas

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 727.
Rama Song, between Nag-chu-ka and Ta-tsien-lu, W. Szechuan.

4. MYOSPALAX CANSUS CANSUS, Lyon

1907. Smiths. Misc. Coll. L, p. 134.
Taocheo, Kansu.

5. MYOSPALAX CANSUS SHANSEIUS, Thomas

1911. Abstr. Proc. Zool. Soc. London, 90, p. 5; Proc. Zool. Soc. London, 1911, p. 178.
Yu-lin-fu, Shensi, China.

6. MYOSPALAX ROTHSCHILDI, Thomas

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 722.
40 miles south-east of Tao-chou, Kansu, China.

smithi Group

7. MYOSPALAX SMITHI, Thomas

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 720.
30 miles south-east of Tao-chou, Kansu, China.

Subgenus *Myospalax*, Laxmann

psilurus Group

8. MYOSPALAX PSILURUS PSILURUS, Milne-Edwards

1874. Rech. Mamm. p. 126.
South of Peking, China.

9. MYOSPALAX PSILURUS EPSILANUS, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 94.
Khingan Mountains, Manchuria.

armandi Group

10. MYOSPALAX ARMANDI, Milne-Edwards

1867. Ann. Sc. Nat. VII, p. 376.
Mongolia.

11. MYOSPALAX DYBOWSKI, Sherskey

1873. Bull. Nat. Moscou, p. 430.
Irkutsk, E. Siberia.

myospalax Group

12. MYOSPALAX MYOSPALAX MYOSPALAX, Laxmann

1773. K. Svenska Vetensk. Akad. Handl. Stockholm, XXXIV, p. 134.
Sommaren, near Paniufcheva, near Alei River, 100 km. from Barnaul, Siberia.

13. MYOSPALAX MYOSPALAX ASPALAX, Pallas

1778. Nov. Sp. Quad. Glir. Ord. p. 165, pl. 10.
Dauuria, Siberia.
Synonym: *zokor*, Desmarest, 1822, Mamm. p. 288.

14. MYOSPALAX MYOSPALAX INCERTUS, Ognev

1936. Abstr. Works. Zool. Inst. Moscou State Univ. 3, p. 82.
Katon-Karagai (Station Allaiskaja), S. Altai.

15. MYOSPALAX MYOSPALAX TARBAGATAICUS, Ognev

1936. Abstr. Works. Zool. Inst. Moscou State Univ. 3, p. 81.
Znamenka, Sergiopolsk region, E. of Lake Balkash, Siberia.

Not seen, and not allocated to Group

16. MYOSPALAX MINOR, Lonnberg

1926. Arkiv for Zoologi, Bd. 18A, no. 21, p. 6.
Near Ashuen, Minshan, W. Kansu.
(Described as near *rothschildi*.)

17. MYOSPALAX KUKUNORIENSIS, Lonnberg

1926. Arkiv for Zoologi, Bd. 18A, no. 21, p. 9.
Lake Kukunor, N.-E. Tibet.
(Described as nearest *baileyi*.)

18. MYOSPALAX RUFESCENS, Allen

1909. Bull. Amer. Mus. Nat. Hist. XXVI, p. 428.
Foot of Tai-pa-shiang, Shensi, China.
(Described as nearest to *cansus*.)

19. MYOSPALAX KOMURAI, Mori

1927. Annot. Zool. Japan, XI, No. 2, p. 108.
Shiheigai, S. Manchuria.
(Described as near *armandi*.)

MYOSPALACINAE: *SPECIAL WORKS OF REFERENCE*

Milne-Edwards, 1874, Rech. Mamm.
Lönnberg, 1926, Arkiv for Zoologi, Bd. 18A, no. 21. Remarks on Mole-Rats of the genus *Myospalax* from China.

Subfamily MICROTINAE

1896. Thomas: Muridae, Arvicolinae.
1899. Tullberg: Family Arvicolidae.
1918. Miller & Gidley: Cricetidae, Microtinae.
1924. Winge: Muridae; Cricetini, part, Arvicolae.
1928. Weber: Muridae, Microtinae.

Geographical Distribution.—Holarctic region, from Arctic south to Guatemala, Yunnan, Burma, the Himalayas, Persia, Syria, Libya, and Mediterranean coast of Europe. Madagascar.

Number of Genera.—Twenty-nine. The subfamily is in the course of being monographed by Mr. M. A. C. Hinton. The classification here used is based on the classification of this author.

Characters.—Cheekteeth $\frac{3}{3}$, complex in structure, prismatic, and frequently evergrowing; a tendency present for the third upper molar to be longer than the second; this tooth is usually the most complex, and certainly the most variable tooth in the upper jaw. Lower jaw with the first molar the dominant and most variable tooth.

Skull always extremely modified in general appearance, the ridges for jaw-muscle attachment more prominent than is normal in Muridae; zygomatic plate broad and strongly tilted upwards; infraorbital foramen small and narrowed. Squamosal usually developing a postorbital crest; a tendency present for the supraorbital ridges to fuse and form a median interorbital crest; deep pits usually present for muscle attachment in the mandible between the molars and the outer side of the jaw (for full details concerning the arrangement of the jaw-muscles of Microtinae see Hinton, Monograph of Voles and Lemmings, 1, 1926, p. 22). Palate as a rule terminating in front of level of hinder part of third molars, its posterior portion frequently becoming specialized.

The zygomatic plate is never cut back anteriorly as it is in so many genera and species of Murinae and Cricetinae. The zygoma is robust. The orbit is situated more anteriorly than in less specialized Muridae, as a rule; and the rostrum is relatively short. The auditory bullae are large as a rule, and in specialized genera contain spongy bone.

The external form is usually slightly specialized for fossorial habits, and nearly always for life in cold or temperate climates (i.e. form not essentially Ratlike). Tail, excepting *Brachytarsomys*, shorter than head and body, usually well haired. One genus, *Ondatra*, is very highly modified for aquatic life (at least as regards the peculiar formation of its tail); two are much modified for underground existence (*Ellobius*, *Prometheomys*); some, as *Dicrostonyx* and *Lemmus*, are specialized for life in Arctic climates.

This is the dominant group of Muridae in the Holarctic region, easily outnumbering any of the other subfamilies, in both number of genera and named forms, in the Palaearctic region, and in North America, and in this respect taking the place, broadly speaking, of the tropical Murinae in the Old World, and the Cricetinae in the New.

Some authors regard the group as being very closely allied to the Cricetinae (for instance, Miller & Gidley, Winge, etc.). Hinton (p. 121) is of the opinion that the group is just as closely allied to the Murinae as to the Cricetinae.

In the opinion of the present author, the present subfamily is so highly specialized, that it appears to be very distinct from both, more so indeed than are Murinae and Cricetinae from each other, if cranial characters and specialization have any value in systematic classification.

The members of this group vary extremely in general aspect of skull from youth to age. One species, *Clethrionomys rufocanus*, has collected at least two generic names based evidently on young, middle-aged, and old specimens of the same species.

The cheekteeth are evergrowing, so far as known, except in the genera *Ellobius*, *Prometheomys*, *Ondatra*, *Dolomys*, *Phenacomys*, *Clethrionomys*, and *Brachytarsomys*. (Also *Neoaschizomys*, not represented in the British Museum, which may be a subgenus of *Clethrionomys*.)

Three generic groups are here recognized. Hinton and most authors divide the subfamily into two, the Lemmi and the Microti; but the difficulty of classifying the Muridae from Madagascar makes it imperative to include *Brachytarsomys* in the present group, for the present, which represents a third generic group. The systematic position of this genus, and the probability that it would have to be transferred here is noted by Hinton (p. 120).

The earliest important paper on the classification of the group was by Miller, North American Fauna, no. 12, 1896. In addition to this, and Hinton's monograph, the work of Russian authors, Vinogradov, Argyropulo, etc., has been studied. There is still difference of opinion as to the exact limits of the genera centred round *Microtus*. The genera here admitted have been fully described by Hinton.

The present classification differs from this author's results in three points: the inclusion of *Brachytarsomys* to form a third generic group (as noted above); the suppression of *Chilotus* to subgeneric rank (as maintained by American authors), owing to intermediate forms between it and *Microtus*; and full generic rank being accorded to the remarkable species separated by Argyropulo as *Blanfordimys* (*B. afghanus* and *bucharicus*).

I have changed the order in which the genera are taken from that of Hinton chiefly because in a work of this description, it is convenient to discuss *Microtus*, the dominant genus round which a large part of the subfamily is collected, as early as is possible.

Key to the Genera of Microtinae

(not including *Neoaschizomys*, which is not represented in the British Museum)

Cheekteeth brachyodont. Third lower molar not reaching down to level of lower incisor.

Brachytarsomys Group (Brachytarsomyes). Brachytarsomys

Cheekteeth strongly hypsodont. Third lower molar always reaching down to level of lower incisor.

Lower incisor short, wholly lingual to molars, terminating posteriorly in the horizontal ramus opposite or in front of alveolus of M.3. (Cheekteeth evergrowing.) Lemmus Group (Lemmi)

Cheekteeth longitudinally complex; inner and outer salient angles approximately equal in size. First lower molar with seven closed triangles between the termination loops. Supraorbital ridges strong, but not fusing in the interorbital region. External form extremely modified for life in Arctic climate; foreclaws of D.2 and D.3 much specialized, with periodic seasonal extra basal outgrowths developing. Squamosal crests more prominent. DICROSTONYX

Cheekteeth longitudinally simplified; inner salient angles of upper and outer angles of lower molars smaller than those of opposite sides. First lower molar with three closed triangles between termination loops (or with two transverse loops, if closed triangles absent). Supraorbital ridges fusing to form median orbital crest in adult. Foreclaws not developing periodic seasonal basal outgrowths. Squamosal crests less prominent.

Posterior palate not terminating as simple transverse shelf. Upper incisors strongly grooved. Toothrows not or less widely divergent posteriorly. (External form not much specialized.) SYNAPTOMYS

Posterior palate terminating as a simple transverse shelf. Upper incisors not strongly grooved. Toothrows widely divergent posteriorly.

External form much modified for life in Arctic regions; foreclaws often abnormally thickened; soles haired, the pads vestigial; ungual phalanges of manus lengthened. LEMMUS

External form not much specialized; foreclaws not thickened; soles not heavily haired, the plantar pads normal; ungual phalanges of manus not lengthened. MYOPUS

Lower incisor long, passing from lingual to labial side of the molars between the bases or roots of M.2 and M.3, and ascending for a greater or lesser distance behind the molars to terminate within or near the condylar process. MICROTUS Group (Microti)

Cheekteeth rooted in adult.

External form extremely modified for underground life. M.$^{3}_{3}$ strongly reduced.

Skull much specialized for fossorial life; incisors lengthened, pro-odont; infraorbital foramen large; palate terminating posteriorly with median spinous process converted into sloping septum between posterolateral pits; foreclaws not specially enlarged. Lower incisor root forming prominent process on mandible. ELLOBIUS

Skull little modified; incisors moderate; infraorbital foramen normal; palate terminating posteriorly as a simple shelf; foreclaws extremely enlarged. Lower incisor root forms no process on mandible. PROMETHEOMYS

External form not modified for underground life. M.$^{3}_{3}$ not strongly reduced.

External form much specialized for aquatic life; tail higher than wide, laterally compressed. Swimming-fringes of feet conspicuous. Skull extremely massive and angular. ONDATRA

External form not specialized for aquatic life.

Posterior palate terminating as a simple transverse shelf. CLETHRIONOMYS

Posterior palate not terminating as a simple transverse shelf, the median spinous process present, converted into sloping septum between posterolateral pits.

Supraorbital ridges fusing to form a median interorbital crest, in adult. Bullae much enlarged. Inner folds of lower molars not conspicuously larger than outer folds. DOLOMYS

Supraorbital ridges not fusing in adult to form median interorbital crest. Bullae not much enlarged. Inner folds of lower molars very deep, the outer folds obsolete. PHENACOMYS

Cheekteeth evergrowing.

External form considerably modified for aquatic life. (M.1 lower with five closed triangles.) NEOFIBER

External form not or rarely showing modifications towards aquatic life. If so (some forms of *Arvicola*), M.1 lower with three closed triangles.

Posterior palate terminating as a simple transverse shelf, the median spinous process, when present, never with its tip connected with the inner borders of the posterolateral pits.

Cheekteeth without long-drawn-out appearance, less angular, the re-entrant folds not widely open. So far as known, supraorbital ridges not fusing to form median interorbital crest.

External form considerably modified for life in Arctic climate. First and second lower molars with closed triangles. ASCHIZOMYS

External form generalized. (Pectoral mammae suppressed.) First and second lower molars normally without closed triangles.

Skull less angular, with temporal ridges widely separated. M.3 (upper) relatively simple. A tendency present (not constant) for M.1 and M.2 (upper) to be more complex than is normal. EOTHENOMYS

Skull more angular, with temporal ridges less widely separated. M.3 (upper) lengthened and complex. (M.1 and M.2 normal.) ANTELIOMYS

Cheekteeth more angular, with long-drawn-out appearance caused by widely open folds. (Pectoral mammae present.)

Supraorbital ridges not fusing to form an interorbital crest. Lower cheekteeth usually with closed triangles. Bullae large; external form not specialized for underground life. ALTICOLA

Supraorbital ridges fusing to form an interorbital crest. Lower cheekteeth usually without closed triangles. Bullae small, reduced. External form considerably specialized for fossorial life. HYPERACRIUS

Posterior palate terminating with the median spinous process converted into a sloping septum between the posterolateral pits, the inner borders of these pits always continuous with the tip or sides of the median process.

External form highly modified, Lemming-like, with much reduced ears (which are concealed in the fur), and much reduced tail. Cheekteeth with re-entrant folds more widely open than is usual. Bullae and mastoids much enlarged, the latter tending to show in superior aspect of skull. Supraorbital ridges strong, but not fused in the interorbital region. M.1 and M.2 with traces of extra complexities between the main inner folds. (M.1 lower with five closed triangles.) LAGURUS

External form not or less specialized; ear less reduced. Cheekteeth normally with the folds less widely open. Bullae and mastoids usually not extremely enlarged, the mastoids not conspicuous in superior aspect of skull, excepting *Blanfordimys* (supraorbital ridges absent, M.1 lower with three closed triangles, form generalized, compare *Lagurus*). M.1 and M.2 without traces of extra complexities between the main inner folds, normally.

Auditory bullae and mastoids abnormally enlarged, the latter showing prominently in superior aspect of skull. Supraorbital ridges (apparently) untraceable. (M.1 lower with three closed triangles.) BLANFORDIMYS

Auditory bullae and mastoids not extremely enlarged, the latter never showing prominently in superior aspect of skull. Supraorbital ridges present.

Third lower molar with closed triangles. (First lower molar with number of closed triangles said to vary individually; inguinal mammae absent or functionless; supraorbital ridges fused in adult.)

Bullae smaller; tail longer; M.3 simpler. ORTHRIOMYS

Bullae larger; tail shorter; M.3 more complex. HERPETOMYS

Third lower molar normally without closed triangles.

First lower molar with three closed triangles.

Supraorbital ridges widely separated in interorbital region in the adult. External form considerably modified for fossorial life. Fourth and fifth triangles confluent with each other in first lower molar, and more or less closed off from anterior loop. PITYMYS

Supraorbital ridges fusing in adult to form median interorbital crest.

Skull in adult massive and angular, with powerful median interorbital crest, squamosal crests, and occipital region. Anterior loop of first lower molar much reduced. Externally slightly modified for fossorial life, sometimes also showing aquatic specialization. ARVICOLA

Skull lighter, not massive, less angular, with moderate squamosal crests, weaker occipital region, and median interorbital crest usually less strongly developed.

External form more modified for fossorial life. Anterior loop of first lower molar strongly reduced. PHAIOMYS

External form not specially modified. Anterior loop of first lower molar usually less reduced, the fourth and fifth triangles typically confluent, and closed off from anterior loop to a greater or lesser degree (there appears to be some variation in this character).

Bullae larger, and mastoids less inflated; braincase less deep. NEODON

Bullae smaller, and mastoids larger; braincase deeper. PEDOMYS

First lower molar with four or five closed triangles.

Upper incisors clearly grooved; lower incisor relatively short; M.3 with only one inner fold. PROEDROMYS

Upper incisors normally plain; lower incisor not short; M.3 with two or three inner folds.

Externally considerably modified for fossorial life; foreclaws larger; sole usually fully haired. LASIOPODOMYS

Externally not specially modified for fossorial life; foreclaws normally smaller (if not, as sometimes in *mandarinus* group, sole naked). MICROTUS

The *Brachytarsomys* Group (Brachytarsomyes)

Cheekteeth brachyodont, rooted; third lower molar not reaching down to level of lower incisor.

Genus 1. BRACHYTARSOMYS, Günther

1875. BRACHYTARSOMYS, Günther, Proc. Zool. Soc. London, p. 79.

TYPE SPECIES.—*Brachytarsomys albicauda*, Günther.

RANGE.—Madagascar.

NUMBER OF FORMS.—One.

CHARACTERS.—This genus, as already indicated, is provisionally included in the Microtinae. Hinton (Monograph of Voles and Lemmings, p. 120) states, "The Vole-like *Brachytarsomys* is generally regarded as a fossorial modification of the Nesomyinae in which the cheekteeth have acquired a strikingly Microtine general appearance, although they are far more brachyodont than in any known Vole; . . . the skull under the influence of fossorial habits and of jaw-muscles, which have developed exactly as in some of the higher Voles, has become almost the counterpart of that of *Arvicola* or *Microtus* in the advanced position of the orbit, the structure of the infraorbital canal, the zygomatic arch, the form and course of the temporal ridges (which fuse in front to form an interorbital crest), and the flattening of the braincase. Although . . . modified in much the same manner as the higher Voles, the cheekteeth are already too reduced and the skull is too highly specialized for the genus to be considered as representing the ancestor common to all Microtinae; but that it has descended from that ancestor there can be little doubt, and it may perhaps be necessary later on to transfer *Brachytarsomys* from the Nesomyinae to the Microtinae."

Most of the essential features of the skull are described in this quotation. Specially to be mentioned is the fact that the interorbital ridges fuse to form a weak median crest. The squamosal crests are scarcely marked. The infraorbital foramen is as in normal Microtinae, but the zygomatic plate, though strongly tilted upwards, appears less broadened than is usual in the group. Jugal thick and long. Palate posteriorly not raised, and differing from normal Microtinae; it is quite unmodified, and more as in Murinae or Cricetinae. Pterygoid fossae shallow. Bullae small. Palatal foramina of medium length, well open.

M.1 with two outer folds, the second deep, and with two inner folds, the posterior of which nearly meets the front outer one. M.2 with two outer, two inner folds originally; the second outer one tends to cut right across the tooth and divide it into two parts. M.3 the smallest tooth (another difference from normal Microtinae); with two outer, one inner folds. Lower teeth: M.1 with three inner, two outer folds; M.2 with two folds each side; M.3 with two outer, one inner folds. Usually there is an isolated island present in the front part of M.1.

Size relatively large; head and body 250 mm. or perhaps more. Hindfoot with long fifth digit; the three central digits subequal and longer; claws quite prominent. Ear small. Tail not reduced, subequal in length to head and body, or perhaps slightly longer than this measurement, moderately or well haired; fur soft.

Forms seen: *albicauda.*

List of Named Forms

(References and type localities for all forms of Microtinae are the work of Mr. G. W. C. Holt.)

1. BRACHYTARSOMYS ALBICAUDA, Gunther

1875. Proc. Zool. Soc. London, p. 80.
Madagascar, between Tamantave and Murundava.

The *Lemmus* Group (Lemmi)

"Lower incisor short, its alveolus not extending backwards to M.3, lingual to molars throughout." (Cheekteeth evergrowing.)

Genus 2. DICROSTONYX, Gloger

1841. Dicrostonyx, Gloger, Hand. u. Hilfsbuch. Naturgesch. 1, pp. xxxi, 97.
1855. Misothermus, Hensel, Zeitschr. deutsch. Geol. Gesellsch. 7, p. 492. (*Myodes torquatus*, Pallas.)

Type Species.—"An American species, probably *Mus hudsonius*, Pallas."

Range.—Arctic regions of Russia, Siberia, and Canada, from the east coast of the White Sea eastwards to Anadyr region, and Novaya Zemlya, New Siberian Islands and other islands to the north of Siberia; Spitzbergen(?). In America, from Alaska to Labrador, and Greenland; also certain islands off Alaska.

Number of Forms.—Ten.

Characters.—Skull with extremely prominent peglike squamosal crests which jut out each side to an abnormal degree; supraorbital ridges powerful but apparently not fusing in interorbital region; zygomatic plate extremely broadened, and infraorbital foramen small, as is normal in the subfamily. Palate "differing from that of *Microtus* chiefly in the extension further forwards of the mesopterygoid fossa and in the shortness and free termination of the postpalatal median septum, which is here represented merely by a short median spine." Palatal foramina long, well developed. Bullae of medium size, spongy within. Cheekteeth evergrowing and complex. M.1 with anterior loop, five alternating triangles, and usually an extra vestigial posteroexternal one also. M.2 with anterior loop, two outer, two inner triangles, and usually the vestigial posteroexternal one, as in M.1. Minute posterointernal angles or their remnants may also be present in M.1 and M.2. M.3 with anterior loop, four alternating closed triangles, and a long or moderate posterior loop; the folds in this tooth are three each side.

In *D. hudsonius*, the posterointernal vestigial angles in M.1 and M.2 are absent; the remaining species have on this account been subgenerically separated as *Misothermus* by G. M. Allen; this division is not considered valid by Hinton (p. 147), and the character appears to be too slight on which to base subgeneric names. Lower molars: M.1 with posterior loop, seven alternating closed triangles (four inner, three outer), and a relatively complex anterior loop. M.2 with posterior loop and four alternating triangles; M.3 like M.2; these teeth may also have vestigial anterior triangles present, each side.

External form much modified for life in Arctic climates. Plantar pads vestigial. Ear almost suppressed. Fur extremely thick. Tail shorter than hindfoot, fully haired; feet much broadened, heavily haired; limbs short. Mammae 2—2=8. Forefoot with the centre two digits bearing enormously thick heavy almost antler-like claws, which are doubled in winter. Hinton, quoting Coues, states, "in spring and early summer these claws (3 and 4) do not appear very different from those of *Myodes* (=*Lemmus*), though averaging larger, more bulbous at base underneath, with the terminal portion slenderer, straighter and sharper. This bulbous portion underneath grows out simultaneously with increase in length and amount of the curvature of the main portion of the claw, until it equals or even exceeds the length of the latter, and is quite as stout, or even stouter, being somewhat broad and padlike. . . . The claw then looks like nearly two claws, one underneath the other. The pad would then seem to gradually sever its connection with the main claw by progressive increase of the constriction marked by the lateral groove and terminal notch, as well as by loosening at the base, . . . it is finally lost." I have seen nothing like this structure elsewhere in the entire Order. Hindclaws relatively long, but not abnormal. The members of this genus turn white in winter.

Forms seen: *groenlandicus*, *hudsonius*, *richardsoni*, *rubricatus*, *torquatus*.

All Palaearctic forms are regarded as of one species only by Vinogradov.

List of Named Forms

1. DICROSTONYX TORQUATUS TORQUATUS, Pallas

1779. Nov. Sp. Quad. Glir. Ord. p. 77.
Region of mouth of River Obi, N.-W. Siberia.
Synonym: *lenensis*, Pallas, 1779, Nov. Sp. Quad. Glir. Ord. p. 195. Siberia.

2. DICROSTONYX TORQUATUS UNGULATUS, von Baer

1841. Von Baer & Helmersen, Beiträge, 4, p. 283.
Novaya Zemlya.

3. DICROSTONYX TORQUATUS CHIONOPAES, G. M. Allen

1914. Proc. New England Zool. Club. 5, p. 62.
Nijni Kolymsk, Kolyma River, N.-E. Siberia.

4. DICROSTONYX RUBRICATUS RUBRICATUS, Richardson

1839. Zool. Capt. Beecheys Voyage, p. 7.
Shore of Behring Strait, Alaska.
Synonym: *nelsoni*, Merriam, 1900, Proc. Washington Acad. Sci. 2, p. 25.
Norton Sound, Alaska.
alascensis, Stone, 1900, Proc. Acad. Sci. Philadelphia, p. 37.
Point Barrow, Alaska.

5. DICROSTONYX RUBRICATUS RICHARDSONI, Merriam

1900. Proc. Washington Acad. Sci. 2, p. 26.
Fort Churchill, west shore Hudson Bay, Keewatin, Canada.

6. DICROSTONYX RUBRICATUS UNALASCENSIS, Merriam

1900. Proc. Washington Acad. Sci. 2, p. 25.
Unalaska, Alaska.

7. DICROSTONYX RUBRICATUS STEVENSONI, Nelson

1929. Proc. Biol Soc. Washington, XLII, p. 145.
Umnak Island, Alaska.

8. DICROSTONYX EXSUL, G. M. Allen

1919. Bull. Mus. Comp. Zool. Harvard Coll. LXII, p. 532.
St. Lawrence Island, Behring Sea, Alaska.

9. DICROSTONYX GROENLANDICUS, Traill

1823. Scoresby's Journ. Voy. Northern Whale-fishery, p. 416.
Jameson's Land, Greenland.

10. DICROSTONYX HUDSONIUS, Pallas

1779. Nov. Sp. Quad. Glir. Ord. p. 208.
Labrador, probably the east coast, Canada.

Genus 3. SYNAPTOMYS, Baird

1857. Synaptomys, Baird, Mamm. North. Amer. p. 558.
1894. Mictomys, True, Proc. U.S. Nat. Mus. XVII, p. 242. (*Mictomys innuitus*, True.) Valid as a subgenus.

Type Species.—*Synaptomys cooperi*, Baird.

Range.—North America: "from the northern edge of the Lower Austral zone in Virginia (Dismal Swamp), and Kansas northwards to Alaska, Mackenzie, and Labrador" (Hinton). Typical *Synaptomys* appears to range mostly in the Eastern U.S.A., from Minnesota and Arkansas eastward to New York, and North Carolina; subgenus *Mictomys* from Alaska, Mackenzie, British Columbia, Alberta, and also Quebec, Labrador, Ungava, New Brunswick, and North-east U.S.A.

Number of Forms.—Twelve.

Characters.—The supraorbital ridges fuse to form a median interorbital crest in the adult. Squamosal crests well developed; rostrum very thick; infraorbital foramen normal. Upper incisors extremely broad, prominently grooved. Bullae very large. Posterior palate nearly as in *Microtus*. Palatal foramina relatively large. Upper cheekteeth with wide folds, these partly filled with cement; the outer folds much deeper than the inner ones. M.1 with two folds each side, the triangles more or less closed; M.2 with two outer, one inner folds; M.3 composed of four transverse loops, these separated by two outer folds, and one inner one, which is placed posteriorly, separating the third and fourth loops. Lower first molar with posterior loop, three closed triangles (one outer, two inner), and anterior loop; M.2 with posterior loop, two closed triangles, and anterior loop; M.3 more or less like M.2. The inner folds are deeper than the outer ones. Lower part of mandible broad, well ridged. External form not highly specialized. Plantar pads 6. Ear reduced. Sole not heavily haired; tail longer than hindfoot. Mammae (Subgenus *Synaptomys*), 1—2=6.

In subgenus Mictomys, there are no closed triangles in the lower molars, M.1 being formed of four transverse loops, M.2 and M.3 being formed of three; the palate has a well-developed spinous process behind (this less developed in *Synaptomys* s.s.), and the mammary formula is 2—2=8. The rostrum is less thickened; the incisors are more slender, and with the groove less well defined.

Synaptomys differs from *Lemmus* in the less specialized external form and the more specialized posterior palate; from *Myopus* in the more specialized palate and the grooved incisors; and from *Dicrostonyx* by the much more simplified molars, and lack of abnormal external specializations.

Forms seen: *borealis*, *cooperi*, *fatuus*, *gossei*, *wrangeli*.

The genus has been revised by Howell, North American Fauna, no. 50, 1927. Only two species are now regarded as valid.

List of Named Forms

Subgenus *Synaptomys*, Baird

1. SYNAPTOMYS COOPERI COOPERI, Baird

1857. Mamm. N. America, p. 558.
Locality unknown; probably northern New Jersey.
Synonym: *fatuus*, Bangs, 1896, Proc Biol. Soc. Washington, X, p. 47. Lake Edward, Quebec.

2. SYNAPTOMYS COOPERI STONEI, Rhoads

1893. Amer. Naturalist, 27, p. 53.
May's Landing, Atlantic County, New Jersey.

3. SYNAPTOMYS COOPERI HELALETES, Merriam

1896. Proc. Biol. Soc. Washington, X, p. 59.
Dismal Swamp, Norfolk County, Virginia.

4. SYNAPTOMYS COOPERI GOSSII, Coues

1877. Monogr. N. Amer. Rodentia, Muridae, p. 235.
Neosho Falls, Woodson County, Kansas.

Subgenus *Mictomys*, True

5. SYNAPTOMYS BOREALIS BOREALIS, Richardson

1828. Zool. Journ. 3, p. 517.
Fort Franklin, Great Bear Lake, Mackenzie, Canada.
Synonym: *bullatus*, Preble, 1902, Proc. Biol. Soc. Washington XV, p. 181. Mackenzie.

6. SYNAPTOMYS BOREALIS ARTEMISIAE, Anderson

1933. Bull. Nat. Hist. Mus. Canada, no. 70, p. 104.
Stevenson Creek, south-west of Princeton, British Columbia.

7. SYNAPTOMYS BOREALIS DALLI, Merriam

1896. Proc. Biol. Soc. Washington, X, p. 62.
Nulato, Alaska.
Synonym: *andersoni*, Allen, 1903, Bull. Amer. Mus. Nat. Hist. XIX, p. 554. Level Mountain, N. British Columbia.

8. SYNAPTOMYS BOREALIS WRANGELI, Merriam

1896. Proc. Biol. Soc. Washington, X, p. 63.
Wrangel, Alaska.
Synonym: *truei*, Merriam, 1896, Proc. Biol. Soc. Washington, X, p. 62. Skagit Valley, Washington.

9. SYNAPTOMYS BOREALIS CHAPMANI, Allen

1903. Bull. Amer. Mus. Nat. Hist. XIX, p. 555.
Glacier, Selkirk Range, British Columbia.

10. SYNAPTOMYS BOREALIS INNUITUS, True

1894. Proc. U.S. Nat. Mus. XVII, 243.
Fort Chimo, Ungava, Canada.

11. SYNAPTOMYS BOREALIS MEDIOXIMUS, Bangs

1900. Proc. New Engl. Zool. Club, 2, p. 40
L'Anse de Loup, Strait of Belle Isle, Labrador.

12. SYNAPTOMYS BOREALIS SPHAGNICOLA, Preble

1899. Proc. Biol. Soc. Washington, XIII, p. 43.
Fabyans, Coos County, New Hampshire.

Genus 4. MYOPUS, Miller

1910. Myopus, Miller, Smiths. Misc. Coll. LII, p. 497.

Type Species.—*Myodes schisticolor*, Lilljeborg.

Range.—Palaearctic: fir forests of Northern Eurasia, from Norway and Sweden across Russia and Siberia to the Sea of Okhotsk; and recorded from Northern Mongolia. Known from Finland, North-west European Russia (Karelia); Siberian Altai, Sayansk Mountains, area surrounding Lake Baikal, Ussuri district, Aian on Okhotsk Sea, River Kolyma (North-east Siberia), etc.

Number of Forms.—Five.

Characters.—Like *Lemmus* (below), but external form little specialized; plantar pads not reduced; sole not heavily haired. "Ungual phalanges of manus normal, much shorter than first and second phalanges combined; metacarpals of third and fourth digits slightly longer than the phalanges" (Miller). The differences in the skeleton of the manus between this genus and *Lemmus* are figured by Miller, Catalogue Mammals Western Europe, 1912, p. 611.

External form not highly specialized; size small; ear reduced, but not abnormally so; fur thick. Mammae 2—2 =8. Plantar pads 6. Palmar pads reduced to 4. Tail very short, well haired.

Skull massive, with widely spreading zygomata, great interorbital constriction, heavy squamosal crests, and fused interorbital ridges. Bullae very large. Toothrows widely divergent posteriorly. Posterior palate as in *Lemmus*. Dentition as in *Lemmus*.

Forms seen: *schisticolor*, *saianicus*.

All named forms are regarded as subspecies of the type by Vinogradov.

List of Named Forms

1. MYOPUS SCHISTICOLOR SCHISTICOLOR, Lilljeborg

1844. Ofversigt. Kongl. Vets. Akad. Forh. Stockholm (1843), p. 65.
Near Lillehammer, Mjosen, Gudbrandsdal, Norway.

2. MYOPUS SCHISTICOLOR MORULUS, Hollister

1912. Smiths. Misc. Coll. LX, no. 14, p. 1.
Tapucha, Altai Mountains, Siberia, 125 miles south-east of Bijsk.

3. MYOPUS SCHISTICOLOR SAIANICUS, Hinton

1912. Ann. Mag. Nat. Hist. 8, XIII, p. 343.
Syansk Mountains, 100 miles west of Lake Baikal, Central Asia.

4. MYOPUS SCHISTICOLOR MIDDENDORFFI, Vinogradov

1922. Ann. Mus. Zool. Acad. Sci. Russ. 23, pp. 374, 512.
Aldoma River, near Ayan, Sea of Okhotsk.

5. MYOPUS SCHISTICOLOR THAYERI, G. M. Allen

1914. Proc. New. Eng. Zool. Club, 5, p. 58.
Nijni Kolymsk, Kolyma River, N.-E. Siberia.

Genus 5. LEMMUS, Link

1795. Lemmus, Link, Zool. Beytr. I, pt. 2, p. 75.
1811. Myodes, Pallas, Zoogr. Rosso-Asiat. 1, p. 172.
1811. Hypudaeus, Illiger, Prod. Syst. Mamm. et Avium, 87–88.

Type Species.—*Mus lemmus*, Linnaeus.

Range.—Northern part of Holarctic region: from Scandinavia, Northern Russia and Siberia to Kamtchatka, and from Pribilof Islands and Alaska across North America to the western side of the Hudson Bay, and Baffin Land. Occurs in Novaya Zemlya, and New Siberian Islands. The *lemmus* group occurs in Norway ("during seasons of abnormal increase the animals wander to the extreme south of Norway" (Miller)), Sweden, Finland, and Kola Peninsula, Russia. The other species occur from the White Sea across Northern Russia and Siberia to Kolyma, Anadyr region, Kamtchatka, etc., south to upper reaches of River Seia, a tributary of the Amur, and to Verhoiansk Mountains (Vinogradov); also Alaska, Mackenzie, Alberta, British Columbia, Baffin Land.

Number of Forms.—Fifteen.

Characters.—Skull exceptionally massive, with extreme interorbital constriction, the ridges fused into a sharp median interorbital crest. Zygomata widely divergent. Squamosal crests and lambdoid crest prominent; interparietal large. Infraorbital foramen as usual in the group; zygomatic plate extremely broad and strong. Palate terminating posteriorly as a transverse shelf, usually with a small median spinous process. Toothrows widely divergent posteriorly. Bullae large. Incisive foramina long, very narrow. Upper cheekteeth: M.1 with anterior loop, four alternating closed triangles, the outer folds deeper than the inner ones; M.2 with anterior loop, three closed triangles, two external, one internal; M.3 with two folds each side, the antero-internal one level with the posteroexternal one, and nearly meeting it; the tooth composed more or less of four transverse loops. Upper incisors sometimes with traces of a groove.

Lower molars: M.1 with a posterior loop, three closed triangles, and anterior loop which has a small fold in it each side; M.2 with posterior loop and four alternating triangles; M.3 with posterior loop, two alternating closed triangles, and an anterior loop. Mandible broad, powerfully ridged.

External form considerably specialized for life in Arctic climates; form heavy, thickset; plantar pads vestigial; sole heavily haired. Limbs short; tail shorter than hindfoot; ear much reduced. Mammae 2—2 = 8. Fur thick. Foreclaws prominent, sometimes extremely thick and reminiscent of those of *Dicrostonyx* when in single condition. One form, *L. c. novosibiricus*, turns white in winter.

"Metacarpals of third and fourth fingers much shorter than phalanges; ungual phalanges of manus greatly enlarged, slightly longer than the first and second phalanges combined" (Miller) (compare *Myopus*). The remarkable migratory habits of the type species are well known.

Forms seen: *helvolus*, *lemmus*, *nigripes*, *obensis*, *trimucronatus*.

Two groups are recognizable, as indicated by Hinton: the *lemmus* group, containing only the type species, which has a highly specialized black and yellow coloured pattern, and the *obensis* group, containing the remainder, with a less attractive more sober coloration, though usually more brightly coloured than most Microtinae. I have followed the classification of Vinogradov regarding the species recognizable in the U.S.S.R. Hinton suggests that all forms of this group may later be regarded as races of the earliest named form.

List of Named Forms

lemmus Group

1. LEMMUS LEMMUS, Linnaeus

1758. Syst. Nat. 10th ed. 1, p. 59.
Mountains of Lappmark, Sweden.
Synonym: *borealis*, Nilsson, 1820, Skand. Faun. 1, 185.
norvegicus, Desmarest, 1822, Mamm. 2, p. 287.

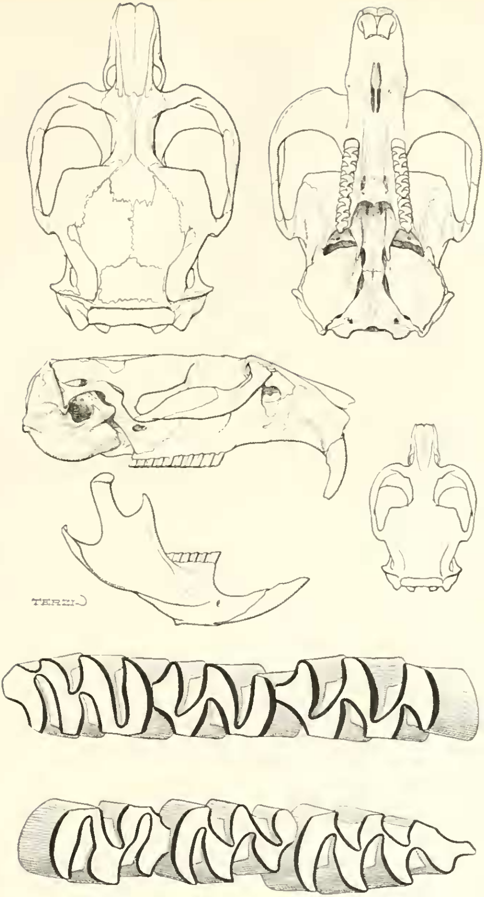

FIG. 41. LEMMUS LEMMUS, Linnaeus.

Above—Skull, three views × 2 (small figure × 1) from Hinton, Monograph of Voles and Lemmings;

Below—Cheekteeth × 9.

obensis-trimucronatus Group

2. LEMMUS OBENSIS OBENSIS, Brants

1827. Het. geslacht d. Muizen, p. 55.
Mouth of River Ob, Siberia.
Synonym: *migratorius*, Lichtenstein, 1823, Eversmanns Reise, p. 123.
bungei, Vinogradov, 1924, Ann. Mag. Nat. Hist. 9, XIV, p. 189. Mouth of Lena River.
minor, Pallas, 1811, Zoogr. Rosso-Asiat. 1, 173.

3. LEMMUS OBENSIS NOVOSIBIRICUS, Vinogradov

1924. Ann. Mag. Nat. Hist. 9, XIV, p. 187.
Kotelmy and Liakhov Islands, N.-E. Siberia.

4. LEMMUS CHRYSOGASTER CHRYSOGASTER, Allen

1903. Bull. Amer. Mus. Nat. Hist. XIX, p. 153.
Gichiga, west coast of Okhotsk Sea, Siberia.

5. LEMMUS CHRYSOGASTER FLAVESCENS, Vinogradov

1925. Ann. Mus. Zool. Acad. Sci. U.S.S.R. p. 62.
Kamtchatka.

6. LEMMUS CHRYSOGASTER PAULUS, G. M. Allen

1914. Proc. New Eng. Zool. Club, 5, p. 60.
Kalaschowo, Kolyma River, N.-E. Siberia.

7. LEMMUS AMURENSIS AMURENSIS, Vinogradov

1924. Ann. Mag. Nat. Hist. 9, XIV, p. 186.
Pikan, on the Zeya River, a tributary of the Amur River, E. Siberia.

8. LEMMUS AMURENSIS OGNEVI, Vinogradov

1933. Tabl. Analyt. Faun. U.R.S.S. 10, Mamm. Rongeurs, p. 58.
Verhoiansk Mountains, E. Siberia.

9. LEMMUS NIGRIPES, True

1894. Proc. U.S. Nat. Nus. XVII, p. 242.
St. George Island, Pribilof Islands, Alaska.

10. LEMMUS ALASCENSIS, Merriam

1900. Proc. Washington Acad. Sci. 2, p. 26.
Point Barrow, Alaska.
Synonym: (?) *albigularis*, Wagner, 1843, Schreber's. Säug. Suppl. III, 602.

11. LEMMUS YUKONENSIS, Merriam

1900. Proc. Washington Acad. Sci. 2, p. 27.
Charlie Creek, Yukon River, Alaska.

12. LEMMUS MINUSCULUS, Osgood

1904. N. Amer. Fauna, no. 24, p. 36.
Kakhtul River, near its junction with Malchatna River, Alaska.

13. LEMMUS TRIMUCRONATUS, Richardson

1825. Journ. Parry's Second Voy. App. p. 309.
Shores of Point Lake, Mackenzie, Canada.

14. LEMMUS HELVOLUS, Richardson

1828. Zool. Journ. 3, p. 517.
Rocky Mountains, Alberta, Canada; near the headwaters of one of the southern tributaries of Peace River, or between there and the Jasper House region.

15. LEMMUS HARROLDI, Swarth
1931. Proc. Biol. Soc. Washington XLIV, p. 101.
Nunivak Island, Alaska.

The *Microtus* Group (Microti)

Lower incisor long; its alveolus extending backwards at least to base of condylar process, lingual to M.1 and M.2, labial to M.3.

Genus 6. CLETHRIONOMYS, Tilesius

1850. Clethrionomys, Tilesius, Isis, II, p, 28.
1874. Evotomys, Coues, Proc. Acad. Nat. Sci. Philadelphia, p. 186. (*Mus rutilus*, Pallas.)
1900. Craseomys, Miller, Proc. Washington Acad. Sci. 2, p. 87. (*Hypudaeus rufocanus*, Sundevall.)
1911. Caryomys, Thomas, Abstr. Proc. Zool. Soc. London, No. 90, p. 4. (*Microtus* (*Eothenomys*) *inez*, Thomas = *Clethrionomys rufocanus shanseius*, Thomas.)
1905. Phaulomys, Thomas, Ann. Mag. Nat. Hist. 7, XV, p. 493. (*Evotomys smithii*, Thomas (= *Clethrionomys rufocanus smithii*).)

Type Species.—*Mus rutilus*, Pallas.

Range.—Holarctic region. Europe including England, but not Ireland, Spain nor Greece. Asia, including Asia Minor, much of China, Siberia, and Japan. North America, across Canada and United States, south to Colorado and North Carolina. Occurs in Arctic regions of both hemispheres. In Europe known from England, Scotland, some of the Hebrides, Denmark, Holland, Belgium, France, Germany, Sweden, Finland, Norway, Hungary, Roumania, Switzerland, Italy, Croatia, and European Russia "southwards approximately to the line Herson–Dnepropetrovsk–Saratov–Orenburg" (Vinogradov). In Siberia, occurs throughout the northern portion, south to Altai, Dzungaria, Semirechyia. In China, known from Mongolia, Shansi, Korea, Hupeh, Manchuria, Chihli, Kansu, and Szechuan. In America, forms named from Alaska, Yukon, Mackenzie, Ungava, Labrador, Ontario, British Columbia, Washington, Oregon, Idaho, the Dakotas, California, Colorado, New Mexico, North Carolina, New Hampshire, New Jersey.

Number of Forms.—Seventy-two or perhaps a few more are named. The American species are revised by Bailey, Proc. Biol. Soc. Washington, XI, p. 113, 1897; the Palaearctic forms by Hinton, Monograph of Voles and Lemmings, I, p. 210, 1926; also European forms by Miller, Cat. Mamm. Western Europe, 1912, p. 623, and Russian and Siberian forms by Vinogradov, Rodents of U.S.S.R., 1933.

Characters.—Typically as in *rutilus* and *glareolus* groups, the skull is weak, with poorly developed squamosal crests; the supraorbital ridges are weak and widely separated in the adult; the interorbital constriction is medium, the braincase broad. In some members of the *nageri* group, particularly *caesarius*, and in the *rufocanus* group, the ridges are more developed, and tend to approach each other in the interorbital region, the squamosal crests are better developed. The ridges never fuse to form a median interorbital crest.

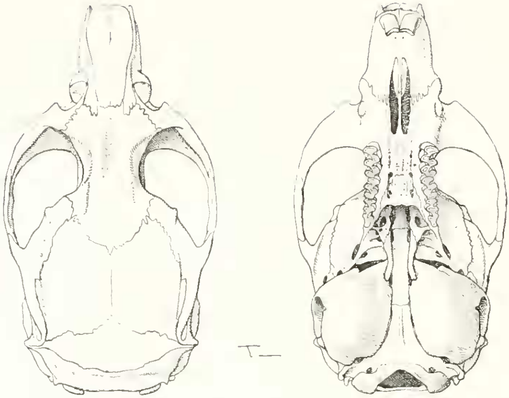

FIG. 42. CLETHRIONOMYS GLAREOLUS GLAREOLUS, Schreber.
B.M. No. 8.11.2.46, ♂; × 3.

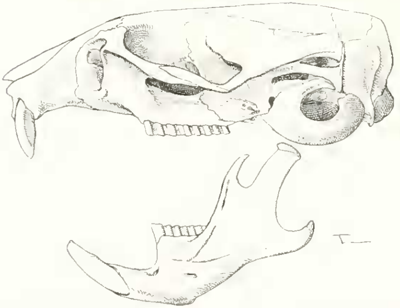

FIG. 43. CLETHRIONOMYS GLAREOLUS GLAREOLUS, Schreber.
B.M. No. 8.11.2.46, ♂; × 3.

Palatal foramina well developed, long. Bullae relatively large, lacking spongy tissue within in living species. Zygomatic plate and infraorbital foramen normal. Palate ending posteriorly as a straight transverse shelf, with no median septum; posterolateral pits present but wholly free from the median spinous process of the palate when the latter is present. Cheekteeth rooted in adult. Upper molars with M.1 and M.2 normal (i.e. in elements agreeing with *Microtus arvalis*); M.3 with anterior loop, three triangles following it (sometimes or often not fully closed), and a posterior loop with the inner re-entrant fold in this either absent, faint, or well developed according to the species or sometimes the

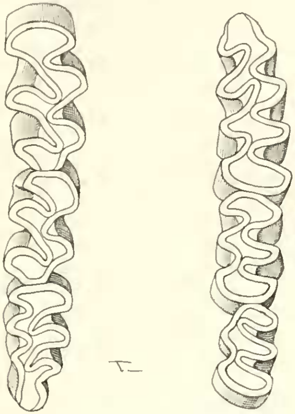

FIG. 44. CLETHRIONOMYS GLAREOLUS GLAREOLUS, Schreber.
B.M. No. 8.11.2.46, ♂; × 14.

individual. M.3 seems most constantly complex, of those seen, in *C. mikado*. Compared with *Microtus*, the molars appear remarkable for their general lack of angularity in appearance. In *C. rufocanus*, roots are developed in the molars at a later stage in life, and the teeth at a certain stage of wear appear more angular than is normal. Owing to intermediate forms, as *C. caesarius*, it is not possible to separate the *rufocanus* group subgenerically; the group is, as indicated in the above synonymy, remarkable for the number of generic or subgeneric names it has collected, in some cases based on the younger or older specimens, as the case may be, of the same species. According to Hinton, *C. rufocanus* further differs from the other species in the fact that the third lower molar is "noticeably displaced by the shaft of the incisor, and encapsuled on the lingual side of the jaw." Lower molars: M.2 and M.3 normal in elements; the triangles in M.2

may be closed or open, in M.3 they are not closed; M.1 has a posterior loop, four alternating triangles, and an anterior loop with an inner fold; the triangles may be open or closed.

External form not much modified; mammae 2—2=8; plantar pads 6; tail usually relatively short, but sometimes exceeding half head and body length; moderately haired, or heavily so in *rutilus* group, and apparently *centralis.* Ear medium; digits normal; back usually red in colour. Hinton arranges the Palaearctic species in four groups, typified by *glareolus*, *nageri*, *rutilus*, and *rufocanus*.

The *rufocanus* group, as indicated above, is clearly distinct from the remainder. The *rutilus* group is described as modified for life in Arctic climates, with ears, limbs, and tail shortened; the skull appears to be near the *glareolus* type. The *nageri* group is described as being rather larger than the *glareolus* species, with more hypsodont teeth, and more angular skull; *C. caesarius*, referred to this group by Hinton, appears a very distinct form. The *glareolus* group is considered the most primitive by Hinton, characters mentioned being brachyodonty, greater complexity of cheekteeth, weakness of jaw muscles, small size and delicacy of skull, small bodily size, etc. For further notes on these groups see Hinton, Monograph of Voles and Lemmings, p. 213. This author's views on the relationships of the American forms are noted below.

Forms seen: "*alcinous*," *alstoni*, *amurensis*, "*andersoni*," "*aquilus*," "*bedfordiae*," *britannicus*, *carolinensis*, *caesarius*, *centralis*, *dawsoni*, *erica*, "*eva*," *frater*, *gapperi*, *glareolus*, *gorkha*, *hallucalis*, *helveticus*, "*inez*," *istericus*, *italicus*, *jacutensis*, *loringi*, "*latastei*," *mikado*, "*nux*," "*niigitae*," *norvegicus*, *nageri*, *nivarius*, *ochraceus*, *ognevi*, *ponticus*, *proteus*, *regulus*, *reinwaldti*, *rufocanus*, *rutilus*, *russatus*, *saianicus*, *shanseius*, *skomerensis*, *smithi*, *sobrus*, *suecicus*, *vasconiae*, *vesanus*, *wosnessenskii*.

List of Named Forms

Palaearctic Forms

glareolus Group

1. CLETHRIONOMYS GLAREOLUS GLAREOLUS, Schreber

1780. Schreber, Säugethiere, iv, p. 680.
Island of Lolland, Denmark.
Synonym: *minor*, Kerr, 1792, Anim. Kingd. 237.
fulvus, Millet, 1828, Faune de Maine-et-Loire, I, 40. France.
hercynicus, Mehlis, Isis, 876, 1831. Germany.
rufescens, de Selys-Longchamps, 1836, Essai. Monogr. sur Campagn. Environs Liège, p. 13. Belgium.
rubidus, Baillon, 1834, Mem. Roy. Soc. D'Emul. d'Abbeville, 1833, p. 54.
pratensis, Cuvier, Hist. Nat. Mamm. vii, 1834. France.

2. CLETHRIONOMYS GLAREOLUS BRITANNICUS, Miller

1900. Proc. Washington, Acad. Sci. 2, p. 103.
Basingstoke, Hampshire, England.
Synonym: *riparia*, Yarrell, 1832, Proc. Zool. Soc. London, p. 109, Essex, England. Not of Ord.
pratensis, Bell, Hist. Brit. Quad. 330, 1837.

3. CLETHRIONOMYS GLAREOLUS REINWALDTI, Hinton
1921. Ann. Mag. Nat. Hist. 9, VIII, p. 128.
Hapsal, Estonia.

4. CLETHRIONOMYS GLAREOLUS SUECICUS, Miller
1900. Proc. Washington Acad. Sci. 2, p. 101.
Upsala, Sweden.

5. CLETHRIONOMYS GLAREOLUS ISTERICUS, Miller
1909. Ann. Mag. Nat. Hist. 8, III, p. 419.
Bustenari, Prahova, Roumania (Carpathians).

6. CLETHRIONOMYS GLAREOLUS HELVETICUS, Miller
1900. Proc. Washington Acad. Sci. 2, p. 98.
Montauban, Haute-Savoie, France.

7. CLETHRIONOMYS GLAREOLUS SOBRUS, Montagu
1923. Proc. Zool. Soc. London, p. 867.
Rescetari, Nova Gradisca, Croatia.

8. CLETHRIONOMYS GLAREOLUS SAIANICUS, Thomas
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 759.
Syansk Mountains, 100 miles west of Lake Baikal, Siberia.

9. CLETHRIONOMYS GLAREOLUS RUTTNERI, Wettstein
1926. Anz. Akad. Wiss. Wien. 63, no. 13, p. 19.
Seetal, near Lunz, Lower Austria.

10. CLETHRIONOMYS GLAREOLUS OGNEVI, Serebrennikov
1927. Ann. Mus. Zool. Leningrad, 27, p. 342.
Samara, Russia.

11. CLETHRIONOMYS CENTRALIS, Miller
1906. Ann. Mag. Nat. Hist. 7, XVII, p. 373.
Koksu Valley, Tian-Shan Mountains.

nageri Group

12. CLETHRIONOMYS NAGERI NAGERI, Schinz
1845. Synops. Mamm. 2, p. 237.
Oberalpsee, near Andermatt, Uri, Switzerland.
Synonym: *bicolor*, Fatio, Rev. Mag. Zool. 2nd ser. XIV, 257, 1862, Switzerland.

13. CLETHRIONOMYS NAGERI ITALICUS, Dal Piaz
1924. Studi Trentini, 5, no. 4, p. 3.
Brennero, Alto Adige, N. Italy.

14. CLETHRIONOMYS NAGERI VESANUS, Hinton
1926. Monogr. Voles & Lemmings, vol. 1, p. 228.
Mittelberg, near Kaufbeuern, Bavaria.

15. CLETHRIONOMYS NAGERI HALLUCALIS, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVIII, p. 221.
Santa Eufemia d'Aspromonte, Calabria, Italy.

16. CLETHRIONOMYS NAGERI VASCONIAE, Miller
1900. Proc. Washington Acad. Sci. 2, p. 96.
Montréjeau, Haute-Garonne, France.

17. CLETHRIONOMYS NAGERI NORVEGICUS, Miller
1900. Proc. Washington Acad. Sci. 2, p. 93.
Bergen, Norway.

18. CLETHRIONOMYS GORKA, Montagu
1923. Proc. Zool. Soc. London, p. 867.
Zalesina, the Gorski Kotar, Croatia.

19. CLETHRIONOMYS SKOMERENSIS, Barrett-Hamilton
1903. Proc. R. Irish Acad. p. 316.
Skomer Island, off coast of Pembrokeshire, Wales.

20. CLETHRIONOMYS ALSTONI, Barrett-Hamilton & Hinton
1913. Abstr. Proc. Zool. Soc. London, No. 119, p. 18; Proc. Zool. Soc. London, 1913, p. 827.
Island of Mull, Inner Hebrides, Scotland.

21. CLETHRIONOMYS ERICA, Barrett-Hamilton & Hinton
1913. Ann. Mag. Nat. Hist. 8, XII, p. 361.
Island of Raasay, near Skye, Scotland.

22. CLETHRIONOMYS PONTICUS, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVII, p. 417.
Sumela, south of Trebizond, Asia Minor.

23. CLETHRIONOMYS FRATER, Thomas
1908. Ann. Mag. Nat. Hist. 8, I, p. 448.
Tian-Shan, probably near Przewalsk, Central Asia.

24. CLETHRIONOMYS CAESARIUS, Miller
1908. Ann. Mag. Nat. Hist. 8, I, p. 194.
St. Helier, Jersey, Channel Islands.

rutilus Group

25. CLETHRIONOMYS RUTILUS RUTILUS, Pallas
1779. Nov. Sp. Quad. Glires. Ord. p. 246.
East of the Obi, Siberia.

26. CLETHRIONOMYS RUTILUS RUSSATUS, Radde
1862. Reise in den Süden von Ost-Siberien, 1, p. 186.
Eastern Syansk Mountains, Siberia.

27. CLETHRIONOMYS RUTILUS JACUTENSIS, Vinogradov
1927. Mat. Comm. Étude Jakoute, no. 18.
Yakutsk, E. Siberia.

28. CLETHRIONOMYS RUTILUS JOCHELSONI, Allen
1903. Bull. Amer. Mus. Nat. Hist. XIX, p. 148.
Verkhne Kolimsk, Kolyma River, N.-E. Siberia.

29. CLETHRIONOMYS RUTILUS OTUS, Turov
1924. Compt. Rend. de l'Acad. Sci. Russie, p. 110.
North-east shore of Lake Baikal, Siberia.

30. CLETHRIONOMYS RUTILUS MOLLESSONAE, Kastschenko
1910. Ann. Mus. Zool. Ac. Sci. St. Petersb. 15, p. 294.
Transbaikalia.

31. CLETHRIONOMYS RUTILUS BAIKALENSIS, Ognev
1924. Bull. Soc. Nat. Moscow, n.s. 31, p. 73.
East of Lake Baikal, Siberia.

32. CLETHRIONOMYS RUTILUS AMURENSIS, Schrenck

1859. Säugeth. Amur-Land, p. 129.
Mouth of Amur River, Siberia, near Nicolaieff.

33. CLETHRIONOMYS RUTILUS (?) LATICEPS, Ognev

1924. Bull. Soc. Nat. Moscow, n.s. 31, p. 75.
Province of Irkutsk, Siberia.

34. CLETHRIONOMYS RUTILUS (?) PARVIDENS, Ognev

1924. Bull. Soc. Nat. Moscow, n.s. 31, p. 77.
Province of Irkutsk, Siberia.

35. CLETHRIONOMYS RUTILUS LENAENSIS, Klojuschew

1936. Trav. Inst. Sci. Biol. Tomsk, 2, p. 292.
Mouth of River Lena, Siberia.

36. CLETHRIONOMYS RUTILUS SALAIRICUS, Egorin

1936. Animadv. Syst. Mus. Tomsk, 3, p. 2.
Salair Mountain range between Ob and Kusnezk Steppe, Siberia.

37. CLETHRIONOMYS MIKADO, Thomas

1905. Abstr. Proc. Zool. Soc. London, p. 19; Proc. Zool. Soc. London, 1905, p. 352.
Aoyama, Hokkaido, Japan.

rufocanus group

38. CLETHRIONOMYS RUFOCANUS RUFOCANUS, Sundevall

1846. Ofv. K. Svenska Vetensk. Akad. Förh. p. 122.
Lappmark, Sweden.
Synonym: *kamtschaticus*, Lataste & Poliakoff, 1884, Ann. Mus. Civ. St. Nat. Genoa, 20, p. 284.
sibirica, Poljakov, Mém. Imp. Ac. Sci. St. Petersb. 39, app. p. 56, 1881.
latastei, Allen, 1903, Bull. Amer. Mus. Nat. Hist. XIX, p. 145. Northern Kamtchatka.
bargusinensis, Turov, 1924, C. R. Acad. Sci. Leningrad, 110. Lake Baikal.

39. CLETHRIONOMYS RUFOCANUS IRKUTENSIS, Ognev

1924. Bull. Soc. Nat. Moscou, p. 69.
Irkutsk Province, Siberia.

40. CLETHRIONOMYS RUFOCANUS SHANSEIUS, Thomas

1908. Proc. Zool. Soc. London, p. 643.
100 miles north-west of Tai-Yuen-Fu, Shan-Si, N. China.
Synonym: *inez*, Thomas, 1908, Abstr. Proc. Zool. Soc. London, p. 45; Proc. Zool. Soc. London, p. 976. Shansi.
alcinus, Thomas, 1911, Abstr. Proc. Zool. Soc. London; p. 50; Proc. Zool. Soc. London, p. 140. West Szechuan.
aquilus, G. M. Allen, 1912, Mem. Mus. Comp. Zool. Harvard, 40, p. 216. Hupeh.
eva, Thomas, 1911, Abstr. Proc. Zool. Soc. London, p. 4; Proc. Zool. Soc. London, p. 175. Kansu.
nux, Thomas, 1910, Abstr. Proc. Zool. Soc. London, p. 26; Proc. Zool. Soc. London, p. 636. Shensi.

41. CLETHRIONOMYS RUFOCANUS REGULUS, Thomas

1907. Proc. Zool. Soc. London, p. 863.
Min-gyong, 110 miles south-east of Seoul, Korea.

42. CLETHRIONOMYS RUFOCANUS SMITHII, Thomas

1905. Ann. Mag. Nat. Hist. 7, XV, p. 493.
Kobe, Hondo, Japan.
Synonym: *bedfordiae*, Thomas, 1905, Abstr. Proc. Zool. Soc. London, p. 18; Proc. Zool. Soc. London, p. 353. Hokkaido.
andersoni, Thomas, 1905, Abstr. Proc. Zool. Soc. London, p. 18; Proc. Zool. Soc. London, p. 354. Hondo.
niigatae, Anderson, 1909, Ann. Mag. Nat. Hist. 8, IV, p. 317. Hondo.

43. CLETHRIONOMYS RUFOCANUS KURILENSIS, Tokuda

1932. Trans. Nat. Hist. Soc. Sapporo, 12, p. 206.
Paramashir Island, Kurile Island, Japan.

44. CLETHRIONOMYS RUFOCANUS OKIENSIS, Tokuda

1933. Annot. Zool. Jap. 13, p. 578.
Oki Islands, Japan.

45. CLETHRIONOMYS RUFOCANUS ARSENJEVI, Dukelsky

1928. Zool. Anz. 77, p. 40.
Ussuri Region, E. Siberia.

46. CLETHRIONOMYS RUFOCANUS KOLYMENSIS, Ognev

1922. Biol. Isvestia, 1, p. 108.
Village Beresovka, near town Sredne-Kolymsk, Russia.

47. CLETHRIONOMYS RUFOCANUS WOSNESSENSKII, Poljakov

1881. Mem. Imp. Ac. Sci. St. Petersb. 39, app. p. 56.
Kamtchatka.

Nearctic Forms

According to Hinton, "among the American forms, *E. gapperi* (and its numerous subspecies), *E. brevicaudus*, *E. carolinensis*, and *E. idahoensis* appear to represent the Old World *glareolus* group; *E. caurinus*, *E. dawsoni*, *E. orca*, *E. ungava*, *E. mazama*, *E. obscurus*, *E. occidentalis*, and *E. nivarius* are, judging from the descriptions, possibly more or less modified members of the *rutilus* group; while *E. phaeus* and *E. wrangeli* appear to represent the *nageri* group. *E. rufocanus* does not seem to have any American equivalent unless indeed *E. mazama* and *E. californicus* can be regarded as dwarfed representatives; possibly too *E. proteus* may belong to the same group."

48. CLETHRIONOMYS CAURINUS, Bailey

1898. Proc. Biol. Soc. Washington, XII, p. 21.
Lund, Malaspina Inlet, British Columbia, Canada.

49. CLETHRIONOMYS PHAEUS, Swarth

1911. Univ. Calif. Pub. Zool. VII, p. 127.
Marten Arm, Boca de Quadra, Alaska.

50. CLETHRIONOMYS WRANGELI, Bailey

1897. Proc. Biol. Soc. Washington, XI, p. 120.
Wrangel, Alaska.

51. CLETHRIONOMYS DAWSONI DAWSONI, Merriam

1888. Amer. Nat. XXII, p. 650.
Finlayson River, a northern source of the Liard River, Yukon, Canada.
Synonym: *alascensis*, Miller, 1898, Proc. Acad. Nat. Sci. Philadelphia, p. 364. St. Michael, Norton Sound, Alaska.

52. CLETHRIONOMYS DAWSONI INSULARIS, Heller
1910. Univ. Calif. Pub. Zool. V, p. 339.
Canoe Passage, Hawkins Island, Prince William Sound, Alaska.

53. CLETHRIONOMYS ORCA, Merriam
1900. Proc. Washington Acad. Sci. 2, p. 24.
Orca, Prince William Sound, Alaska.

54. CLETHRIONOMYS GAPPERI GAPPERI, Vigors
1830. Zool. Journ. V, p. 204.
Between York and Lake Simcoe, Ontario, Canada.
Synonym: *fuscodorsalis*, Allen, 1894, Bull. Amer. Mus. Nat. Hist. VI, p. 103. Trousers Lake, New Brunswick.

55. CLETHRIONOMYS GAPPERI OCHRACEUS, Miller
1894. Proc. Boston Soc. Nat. Hist. XXVI, p. 193.
Mount Washington, Coos County, New Hampshire.

56. CLETHRIONOMYS GAPPERI RHOADSII, Stone
1893. Amer. Nat. XXVII, p. 55.
May's Landing, Atlantic County, New Jersey.

57. CLETHRIONOMYS GAPPERI LORINGI, Bailey
1897. Proc. Biol. Soc. Washington, XI, p. 125.
Portland, Traill County, N. Dakota.

58. CLETHRIONOMYS GAPPERI ATHABASCAE, Preble
1908. North Amer. Fauna, no. 27, p. 178.
Fort Smith, Slave River, Mackenzie, Canada.

59. CLETHRIONOMYS GAPPERI GALEI, Merriam
1890. North Amer. Fauna, no. 4, p. 23.
Ward, Boulder County, Colorado.

60. CLETHRIONOMYS GAPPERI SATURATUS, Rhoads
1894. Proc. Acad. Nat. Sci. Philadelphia, p. 284.
Nelson, British Columbia, Canada, on Kootenai River, 30 miles north of northern boundary of Washington.

61. CLETHRIONOMYS BREVICAUDUS, Merriam
1891. North Amer. Fauna, no. 5, p. 119.
3 miles north of Custer, Black Hills, Custer County, S. Dakota.

62. CLETHRIONOMYS CAROLINENSIS, Merriam
1888. Amer. Journ. Sci. 3, XXXVI, p. 460.
Roan Mountain, Mitchell County, N. Carolina.

63. CLETHRIONOMYS LIMITIS, Bailey
1913. Proc. Biol. Soc. Washington, XXVI, p. 133.
Willow Creek, Mogollon Mountains, Socorro County, New Mexico.

64. CLETHRIONOMYS UNGAVA, Bailey
1897. Proc. Biol. Soc. Washington, XI, p. 130.
Fort Chimo, Ungava, Canada.

65. CLETHRIONOMYS IDAHOENSIS, Merriam
1891. North Amer. Fauna, no. 5, p. 66.
Sawtooth Lake, Blaine County, Idaho.

66. CLETHRIONOMYS MAZAMA, Merriam
1897. Proc. Biol. Soc. Washington, II, p. 71.
Crater Lake, Mount Mazama, Klamath County, Oregon.

67. CLETHRIONOMYS OBSCURUS, Merriam

1897. Proc. Biol. Soc. Washington, II, p. 72.
Prospect, Upper Rogue River Valley, Jackson County, Oregon.

68. CLETHRIONOMYS CALIFORNICUS, Merriam

1890. North Amer. Fauna, no. 4, p. 26.
Eureka, Humboldt County, California.

69. CLETHRIONOMYS OCCIDENTALIS, Merriam

1890. North Amer. Fauna, No. 4, p. 25.
Aberdeen, Chehalis County, Washington.
Synonym: *pygmaeus*, Rhoads, 1894, Proc. Acad. Nat. Sci. Philadelphia, p. 284. Pierce County, Washington.

70. CLETHRIONOMYS NIVARIUS, Bailey

1897. Proc. Biol. Soc. Washington, II, p. 136.
Mount Ellinor, Olympic Mountains, Mason County, Washington.

71. CLETHRIONOMYS PROTEUS, Bangs

1897. Proc. Biol. Soc. Washington, II, p. 137.
Hamilton Inlet, Labrador, Canada.

72. CLETHRIONOMYS ALBIVENTER, Hall & Gilmore

1933. Univ. Calif. Pub. Zool. 38, p. 398.
St. Lawrence Island, Behring Sea.

We have been unable to trace the references of the following forms, quoted by Vinogradov in his Rodents of U.S.S.R.:

A. *Clethrionomys rutilus uralensis*, from Northern Ural Mountains.
B. *Clethrionomys rutilus rossicus*, from Middle Ural Mountains.
C. *Clethrionomys rutilus tugarinovi*, from the Lower Yenesei River.
D. *Clethrionomys rutilus dorogostaiskii*, from Northern Amur district.
E. *Clethrionomys rutilus hintoni*, from South Ussuri.

The genus *Neoaschizomys*, not represented in the British Museum, which may be not more than a subgenus of *Clethrionomys*, will be noticed at the end of the subfamily.

Genus 7. ASCHIZOMYS, Miller

1898. Aschizomys, Miller, Proc. Acad. Nat. Sci. Philadelphia, p. 369.

Type Species.—*Aschizomys lemminus*, Miller.

Range.—Described from Plover Bay, Behring Strait, North-east Siberia. Also known from mouth of River Lena, Verhoiansk Mountains, and other localities in North-east Siberia.

Number of Forms.—One.

Characters.—Skull without special peculiarities, bullae relatively large; supraorbital ridges weak in the one skull examined. Palate posteriorly as in *Clethrionomys*. Upper cheekteeth with narrow folds (as in *Clethrionomys*, quite different from *Alticola*), M.1, M.2 normal; M.3 complex, with anterior loop, three closed alternating triangles, and a posterior loop with a deep inner fold (in the one examined). Lower teeth: M.1 with posterior loop, five closed triangles, and anterior loop; M.2 normal; M.3 more or less normal. Cheekteeth, so far as known, rootless. External form considerably modified for life in cold climate; relatively thickset, with tail fully haired, and scarcely longer than hindfoot; fur thick; sole haired. Ear moderate.

Remarks.—Some doubt has existed as to the validity of this genus, which for many years was known by one specimen only. Vinogradov refers it to *Alticola*, as a subgenus; but the very different general appearance of the cheekteeth seems to warrant the retention of the genus.

Forms seen: *lemminus*.

List of Named Forms

1. ASCHIZOMYS LEMMINUS, Miller

1898. Proc. Acad. Nat. Sci. Philadelphia, p. 369.
Kelsey Station, Plover Bay, Behring Strait, N.-E. Siberia.

Genus 8. EOTHENOMYS, Miller

1896. Eothenomys, Miller, North Amer. Fauna, no. 12, p. 45.

Type Species.—*Arvicola melanogaster*, Milne-Edwards.

Range.—Asia: Assam, Burma, Yunnan, Szechuan, Hupeh, Fokien, North Tongking, and Formosa.

Number of Forms.—Twelve.

Characters.—Skull weak, with interorbital region relatively wide, supraorbital ridges not approaching each other. Squamosal crests quite well developed. Bullae lacking spongy tissue, as in *Clethrionomys* and allies. Infraorbital foramen normal. Posterior palate as in *Clethrionomys*. Cheekteeth evergrowing; in the type species, M.1 is complex and abnormal, having an anterior loop, three alternating closed triangles, and a posterior loop consisting of two confluent triangles, so that the folds are three on the inner side, two on the outer side. M.2 has three more or less transverse loops, with two folds each side. M.3 with three transverse loops, the posterior one the largest, sometimes with an extra posterior inner fold. In this tooth there may be three folds each side, or two each side, or two inner, three outer. Lower teeth M.2 and M.3 with three transverse loops; M.1 with posterior loop, two transverse loops closed from each other, and finally a transverse loop which is confluent with the anterior loop. *E. proditor* has, for the genus, an aberrant dentition, with M.1 upper and M.2 more or less normal (reduced as compared with *melanogaster*), and M.3 with a straight anterior loop, three triangles, and a long straight posterior loop, only two well-marked inner folds in this tooth; general appearance of M.3 *Alticola*-like. *E. olitor* has M.1 apparently in three transverse loops, with only two folds each side, as in *proditor*; and M.3 nearer to that of *proditor* than the type species, but with three folds each side. The lower molars of the last two species are not highly abnormal.

External form generalized; tail from a quarter to a half head and body length; ear not reduced; mammae 0—2—4; plantar pads 6.

The species may be arranged in two groups typified by *melanogaster* and *olitor* based on the dental differences indicated above, of which the most important seems to be the pattern on M.1.

Forms seen: *cachinus*, *colurnus*, *confinii*, *eleusis*, *fidelis*, *libonotus*, *melanogaster*, *miletus*, *mucronatus*, *olitor*, *proditor*.

List of Named Forms

melanogaster Group

1. EOTHENOMYS MELANOGASTER MELANOGASTER, Milne-Edwards

1872. Rech. Mamm. p. 284.
Moupin, W. Szechuan, China.

2. EOTHENOMYS MELANOGASTER CACHINUS, Thomas

1921. Journ. Bombay Nat. Hist. Soc. XXVII, p. 504.
Imaw Bum, Kachin Province, N. Burma.

3. EOTHENOMYS MELANOGASTER ELEUSIS, Thomas

1911. Abstr. Proc. Zool. Soc. London, p. 50; Proc. Zool. Soc. London, p. 139.
East of Chao-tung-fu, N. Yunnan.

4. EOTHENOMYS MELANOGASTER AURORA, G. M. Allen

1912. Mem. Mus. Comp. Zool. Harvard. Coll. 40, p. 211.
Changyangshien, Hupeh, China.

5. EOTHENOMYS MELANOGASTER MILETUS, Thomas

1914. Ann. Mag. Nat. Hist. 8, XIV, p. 474.
10 miles west of Yang-pi, W. Yunnan.

6. EOTHENOMYS MELANOGASTER CONFINII, Hinton

1923. Ann. Mag. Nat. Hist. 9, XI, p. 151.
Kiu-chiang, Salween divide in latitude 28 N., Yunnan.

7. EOTHENOMYS MELANOGASTER COLURNUS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VII, p. 209.
Kuatun, N.-W. Fo-Kien, S. China.
Synonym: (?) *bonzo*, Cabrera, 1922, Bol. Soc. Esp. Hist. Nat. 22, p. 168. Foochow.

8. EOTHENOMYS MELANOGASTER MUCRONATUS, G. M. Allen

1912. Mem. Mus. Comp. Zool. Harvard Coll. 40, p. 214.
Tachiao, W. Szechuan.

9. EOTHENOMYS MELANOGASTER LIBONOTUS, Hinton

1923. Ann. Mag. Nat. Hist. 9, XI, p. 151.
Dreyi, Mishmi Hills, Assam.

10. EOTHENOMYS FIDELIS, Hinton

1923. Ann. Mag. Nat. Hist. 9, XI, p. 150.
West flank of Lichiang Range, Yunnan.

olitor Group

11. EOTHENOMYS PRODITOR, Hinton

1923. Ann. Mag. Nat. Hist. 9, XI, p. 152.
Lichiang Range. N.-W. Yunnan. Lat. 27 30′ N.

12. EOTHENOMYS OLITOR, Thomas

1911. Abstr. Proc. Zool. Soc. London, p. 50; Proc. Zool. Soc. London, p. 139.
Chao-tung-fu, Yunnan.

Genus 9. ANTELIOMYS, Miller

1896. Anteliomys, Miller, North Amer. Fauna, no. 12, p. 47.

Type Species.—*Microtus chinensis*, Thomas.

Range.—China: Szechuan and Yunnan.

Number of Forms.—Six.

Characters.—Like *Eothenomys*, but skull stronger, with supraorbital ridges tending to come together (though none examined have these ridges fused); M.3 very complex, but M.1 and M.2 normal. Sometimes in M.1 and M.2 the alternating triangles are not fully closed. M.3 very long, with four inner folds, and three or four outer ones (in one form the inner folds reduced to three). Lower cheekteeth: M.2, M.3 as *Eothenomys*; M.1 with posterior loop, in front of which are two transverse loops, then an inner triangle opening into the rounded anterior loop. The palate is as in *Clethrionomys*, posteriorly.

Essential external characters as in *Eothenomys*, including the mammary formula; in *custos* the tail is rather less than half head and body length; in the other species it may be up to two-thirds this length.

Forms seen: *chinensis*, *custos*, *tarquinius*, *wardi*.

List of Named Forms

1. ANTELIOMYS CHINENSIS CHINENSIS, Thomas

1891. Ann. Mag. Nat. Hist. 6, VIII, p. 117.
Kia-ting-fu, W. Szechuan, China.

2. ANTELIOMYS CHINENSIS TARQUINIUS, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 517.
23 miles south-east of Ta-tsien-lu, W. Szechuan.

3. ANTELIOMYS WARDI, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 516.
Chamutong, N.-W. Yunnan, west of A-tun-tsi.

4. ANTELIOMYS CUSTOS CUSTOS, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 517.
A-tun-si, N.-W. Yunnan.

5. ANTELIOMYS CUSTOS RUBELIUS, G. M. Allen

1924. Amer. Mus. Nov. no. 133, p. 5.
Shu-shan, Li-chiang Range, Yunnan.

6. ANTELIOMYS CUSTOS HINTONI, Osgood

1932. Field. Mus. Nat. Hist. Pub. Zool. ser. XVIII, p. 321.
Wushi, south-west of Ta-tsien-lu, Szechuan, China.

Genus 10. ALTICOLA, Blanford

1881. ALTICOLA, Blanford, Journ. Asiat. Soc. Bengal, L, pt. 2, p. 96.
1901. PLATYCRANIUS, Kascenko, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersb. 6, p. 199. (*Microtus strelzowi*, Kascenko.) Valid as a subgenus.

TYPE SPECIES.—*Arvicola stoliczkanus*, Blanford.

RANGE.—High mountains of Central Asia; Russian Turkestan (Hissar Mountains), Kashmir, south in India to Kumaon; Tibet, Chinese Turkestan, Southern Siberia, to Lake Baikal, Semipalatinsk, Sayan Mountains, Altai Mountains, Tianshan, Djarkent; Mongolia.

NUMBER OF FORMS.—Twenty-five approximately.

CHARACTERS.—Skull relatively weak, with supraorbital ridges wide apart in the adult, and squamosal crests usually poorly developed. Infraorbital foramen and zygomatic plate normal for subfamily. Palate posteriorly essentially as in *Clethrionomys*. Palatal foramina usually long and relatively well open, particularly in the subgenus *Platycranius*. Bullae large, well inflated, lacking spongy tissue. Upper cheekteeth: M.1, M.2 normal; in the majority of the species, M.3 has a straight anterior loop followed by three triangles, which are often not fully closed, and a long straight posterior loop with a faint or moderate indentation in its inner side. The folds of the cheekteeth are always noticeably wide in this genus, and contain little cement. In the type species and allies (*stoliczkanus* group) the third molar is more reduced, with only two clear triangles behind the anterior loop, the usual posteroexternal one vestigial, and the posterior loop short and straight; in these species there are only two clear inner folds. There are several slight variations in the pattern of this tooth, in the different species. In *Platycranius*, so far as seen, M.3 has two inner folds, and the posterior loop is much shortened, but the second outer triangle is not reduced. Lower cheekteeth: M.3 with three transverse loops; M.2 with posterior loop, four alternating closed triangles; M.1 with posterior loop, five alternating triangles, the first four after the posterior loop closed, the fifth (anterointernal) merged into the anterior loop.

Mammae 2—2 = 8. Plantar pads 6. External form not modified for fossorial life. Fur often extremely thick. Sole usually partly haired posteriorly. Tail well haired, in all but *argurus*, *blanfordi*, *roylei*, *montosa* of those seen the scales are concealed; ear not reduced. The tail varies from about half head and body length to little longer than hindfoot.

PLATYCRANIUS is proposed as a subgenus for those species in which the braincase and frontals are abnormally flattened. The infraorbital foramen appears in these forms rather larger than normal. This formation appears to be a modification for life under rocks, and as already noted, parallels the subgenus *Gliriscus* of the African genus of Dormice, *Graphiurus*.

The species of subgenus *Alticola* may be arranged in two groups characterized by the formation of M.3, as already indicated; these species have been keyed by Hinton, Monograph of Voles and Lemmings, p. 306. A few species not included in this key, and not represented in the British Museum, appear according to

Vinogradov's figures to be distinct from either the *roylei* or *stoliczkanus* groups; *macrotis*, with an unusually short tail according to descriptions, and with a simpler M.3 than is known in the species represented in London (this lacking closed triangles); and *altaica*, in which the first triangle of M.3 is not merged in the anterior loop. These types are figured by Vinogradov, Rodents of U.S.S.R.

Forms seen: *argurus*, *blanfordi*, "*cricetulus*," "*imitator*," *lahulius*, *lama*, *montosa*, *phasma*, *roylei*, *semicanus*, *stracheyi*, *strelzowi*, *subluteus*, *worthingtoni*.

List of Named Forms

Subgenus *Alticola*, Blanford

roylei Group

1. ALTICOLA ARGENTATA, Severtzow

1879. Sapiski Turkest. Otdela Obsochvestva Lubitelei Estestvosnania, Antropologii, Ethnograp. vol. I, pp. 63–64.
Alichur, Pamir Mountains.
Synonym: *argurus*, Thomas, Ann. Mag. Nat. Hist. 8, III, p. 264. 1909. Hissar Mountains, 100 miles east of Samarkand.

2. ALTICOLA BLANFORDI BLANFORDI, Scully

1880. Ann. Mag. Nat. Hist. 5, VI, p. 399.
Gilgit, N. India, at altitudes between 9,000 and 10,000 feet.

3. ALTICOLA BLANFORDI LAHULIUS, Hinton

1926. Monogr. Voles and Lemmings, 1, p. 309.
Kyelang, Lahul.

4. ALTICOLA ROYLEI ROYLEI, Gray

1842. Ann. Mag. Nat. Hist. X, p. 265.
Kumaon, N. India.

5. ALTICOLA ROYLEI CAUTUS, Hinton

1926. Monogr. Voles and Lemmings, 1, p. 313.
Rahla, Kulu Valley, Lahul.

6. ALTICOLA ALBICAUDA, True

1894. Proc. U.S. Nat. Mus. XVII, p. 12.
Braldu Valley, Baltistan.

7. ALTICOLA MONTOSA, True

1894. Proc. U.S. Nat. Mus. XVII, p. 11.
Central Kashmir.
Synonym: *imitator*, Bonhote, 1905, Ann. Mag. Nat. Hist. 7, XV, p. 197. Kashmir.

8. ALTICOLA GLACIALIS, Miller

1913. Proc. Biol. Soc. Washington, XXVI, p. 197.
Chogo Lungma Glacier, Baltistan.

9. ALTICOLA PHASMA, Miller

1912. Proc. Biol. Soc. Washington, XXV, p. 59.
East side of Karakorum Mountains, Chinese Turkestan.

10. ALTICOLA WORTHINGTONI WORTHINGTONI, Miller

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 372.
Tian-Shan Mountains (Koksu).
Synonym: *gracilis*, Kashkarov, 1923, Trans. Sci. Soc. Turkest. p. 203. Tianshan.
longicauda, Kashkarov, 1923, Trans. Sci. Soc. Turkest. p. 203.
villosa, Kashkarov, 1923, Trans. Sci. Soc. Turkest. p. 203.

11. ALTICOLA WORTHINGTONI SUBLUTEUS, Thomas

1914. Ann. Mag. Nat. Hist. 8, XIII, p. 570.
Djarkent, Semiretchensk, Central Asia.

12. ALTICOLA WORTHINGTONI SEMICANUS, G. M. Allen

1924. Amer. Mus. Nov. 133, p. 6.
Sain Noin Khan, Mongolia.

13. ALTICOLA WORTHINGTONI ALLENI, Argyropulo

1933. Zeitschr. für Säugetierk. 8, p. 180.
N. Mongolia; Kentej, 40 km. östlich Urga (Ulan-Bator-Choto).

stoliczkanus Group

14. ALTICOLA STOLICZKANUS, Blanford

1875. Journ. Asiat. Soc. Bengal, 44, pt. 2, p. 107.
Kuenlun Mountains, in N. Ladak.

15. ALTICOLA STRACHEYI, Thomas

1880. Ann. Mag. Nat. Hist. 5, VI, p. 332.
"Kumaon" = Ladak.
Synonym: *cricetulus*, Miller, 1899, Proc. Acad. Nat. Sci. Philadelphia, p. 294. Tso-Kyun, Ladak.

16. ALTICOLA LAMA, Barrett-Hamilton

1900. Proc. Zool. Soc. London, p. 196.
25 miles south-east of Lake Arucho, W. Tibet.

17. ALTICOLA ACROPHILUS, Miller

1899. Proc. Acad. Nat. Sci. Philadelphia, p. 296.
Ladak side of Karakorum Pass.

Not allocated to Group

18. ALTICOLA ALTAICA, Vinogradov

1933. Trav. L'Inst. Zool. Acad. Sci. p. 63.
Siberian Altai, Ivanorskie Beli, near Village Riddersk, of Ust-Kamenogorsk subdistrict.

19. ALTICOLA MACROTIS, Radde

1862. Reise in den Süden von Ost-Siberien, 1, p. 196.
Eastern Sayan Mountains, Siberia.

20. ALTICOLA VINOGRADOVI, Rasorenova

1933. Bull. Soc. Nat. Moscou. Sect. Biol. 42, p. 79.
Siberia; Altai Mountains.

21. ALTICOLA (?) NANSCHANICUS, Satunin

1903. Ann. Mus. St. Petersb. VII, p. 575.
Scharogol-dschin (Nan-shan), Central Asia.
(Described as near *blanfordi*.)

22. ALTICOLA (?) KAZNAKOVI, Satunin

1903. Ann. Mus. St. Petersb. VII, p. 581.
Central Asia, River Chi-tschju (Oberlauf des Blauen Flusses).
(According to Vinogradov, Rodents of U.S.S.R., belongs to the genus *Pitymys*).

Subgenus *Platycranius*, Kastschenko

23. ALTICOLA ALLIARIUS, Pallas

1779. Nov. Sp. Quad. Glir. Ord. p. 252.
Neighbourhood of Jenisseisk, Jenisseisk Province, Siberia.

24. ALTICOLA STRELZOWI STRELZOWI, Kastschenko

1900. Bull. Imp. Tomsk. Univ. 16, p. 50.
Altai Mountains, Siberia.

25. ALTICOLA STRELZOWI DESERTORUM, Kastschenko

1901. Ann. Mus. Zool. Acad. Sci. Petersb. 6, p. 206.
Neighbourhood of Jenisseisk, Jenisseisk Province, Siberia.

Genus 11. HYPERACRIUS, Miller

1896. Hyperacrius, Miller, North Amer. Fauna, no. 12, p. 54.

Type Species.—*Arvicola fertilis*, True.

Range.—North India: Kashmir and Punjab.

Number of Forms.—Four.

Characters.—Externally rather highly modified for underground life; fur thick; ears reduced; sole hairy posteriorly; foreclaws considerably though not excessively lengthened; tail short, well haired. Mammae 1—2=6. Plantar pads 5.

Cheekteeth in general appearance essentially as in *Alticola*; M.3 reduced, with two folds each side, the posteroexternal one very wide; the posterior loop very short. Lower molars: M.2 and M.3 each in three transverse loops, without closed triangles; M.1 with posterior loop, three triangles, not fully closed, in front of which are two more confluent triangles opening into the anterior loop. Skull differing from *Alticola* and allies in the bullae, which are small and reduced (but lacking spongy tissue internally), and the temporal ridges which fuse in the adult to form a median interorbital crest. Palatal foramina narrowed, slit-like; rostrum relatively long, and incisors slightly pro-odont; squamosal crests strong; skull more angular than in *Alticola*.

Forms seen: *aitchisoni*, *brachelix*, *fertilis*, *wynnei*.

List of Named Forms

1. HYPERACRIUS FERTILIS FERTILIS, True

1894. Proc. U.S. Nat. Mus. XVII, p. 10.
Pir Panjal Mountains, Kashmir.

2. HYPERACRIUS FERTILIS BRACHELIX, Miller

1899. Proc. Acad. Nat. Sci. Philadelphia, p. 290.
Nagmarg, Kashmir.

3. HYPERACRIUS AITCHISONI, Miller

1897. Proc. Biol. Soc. Washington, XI, p. 141.
Gulmerg, Kashmir.

4. HYPERACRIUS WYNNEI, Blanford

1880. Journ. Asiat. Soc. Bengal, 49, pt. 2, p. 244.
Murree, Punjab.

Genus 12. PHENACOMYS, Merriam

1889. PHENACOMYS, Merriam, North Amer. Fauna, no. 2, p. 28.
1915. ARBORIMUS, Taylor, Proc. Cal. Acad. Sci. 4, V, p. 119. (*Phenacomys longicaudus*, True.)

TYPE SPECIES.—*Phenacomys intermedius*, Merriam.

RANGE.—"In scattered localities through practically the whole of Upper Canadian and Hudsonian zones of Canada . . . apparently absent from Alaska; in United States . . . in Rocky Mountain system as far south as Northern New Mexico, on boreal summits of isolated mountain ranges of the Great Basin, and south in Sierra Nevada at least to the Yosemite Park, California; also in the coastal belt of Oregon and North California" (Howell). Good range maps published by Howell, and in Anthony, Field Book North American Mammals, 1928, p. 407. In Canada, extending east to Labrador; in U.S.A., to Montana, Wyoming, and Colorado.

NUMBER OF FORMS.—Ten. The genus is revised by Howell, North Amer. Fauna, no. 48, 1926.

CHARACTERS.—An isolated genus, with rooted cheekteeth, the pattern of which in some respects appears unique in *Microti*; agreeing with *Microtus* rather than *Clethrionomys* in the formation of the posterior palate.

"Skull with the ridges widely separated in the adult" (Hinton); as figured by Howell this character seems constant, though one skull figured of *P. mackenziei* appears to have these ridges approaching each other. Bullae medium, without internal spongy tissue (Hinton). Palate of *Microtus* type posteriorly, but "posterolateral bridges usually absent, the posterior median septum short and horizontal, and the posterolateral pits very shallow."

Cheekteeth rooted, M.1, M.2 apparently normal; M.3 with only two inner folds (and two outer ones). Lower cheekteeth *Synaptomys*-like in general appearance owing to the fact that the inner folds are extremely deep, and the outer ones very shallow. M.3 almost in three transverse loops. M.2 is similar, with the outer triangles very reduced. M.1 with three inner, two outer triangles, a posterior loop, and an anterior loop, the latter variable in structure. "M.1 (lower) is a complex tooth with four or five outer, and six inner salient angles, consisting of a posterior loop followed by from three to seven substantially closed triangles, and terminated by an anterior loop . . . the interest of this tooth in *Phenacomys* lies in the unusual variability which it displays, from species to species, in the number of closed triangles; in some species only the three posterior are closed . . . in other species, four, five, six or even seven triangles may be closed, the tooth resembling that of genera like *Microtus*. Among other voles (*Mimomys* (fossil), *Arvicola*, *Pitymys*, *Microtus*, etc.) with the exception of *Orthriomys* and *Herpetomys*, the possession by M.1 of three closed triangles on the one hand, or of four or more on the other, has been a distinction of generic importance since Pliocene times at least; but in *Phenacomys* both types of M.1 are associated, and the distinction between them, if it be of systematic value at all, is of no more than specific importance" (Hinton).

Mammae 2—2=8 (Howell), but evidently may vary.

Plantar pads 6. External form in all examined not specially modified, relatively short-tailed; but in some species, as *P. longicaudus* and *albipes*, the tail is long. The habits are said in these species to be arboreal.

I have been able to examine only very few specimens of this genus.

Forms seen: "*latimanus*," *ungava*.

The forms are arranged by Howell in four groups:

intermedius group, characterized by short tail, and face without distinct yellow wash; Western: British Columbia to Montana and California;

ungava group, characterized by distinct yellow coloration of face; Canada east of Rocky Mountains, to Labrador;

albipes group, characterized by long tail and sooty nose, and long weak skull, found in "humid coastal forests of Northern California and Oregon"; and

longicaudus group, characterized by long tail and arboreal habits; Northern California and Oregon.

The tail is more hairy than in other species, according to Howell; and the incisors are decurved.

List of Named Forms

intermedius Group

1. PHENACOMYS INTERMEDIUS INTERMEDIUS, Merriam

1889. North Amer. Fauna, no. 2, p. 32.
Basaltic plateau about 20 miles north-north-west of Kamloops, British Columbia, Canada.
Synonym: *orophilus*, Merriam, 1891, North Amer. Fauna, no. 5, p. 65. Timber Creek, Lemhi Mountains, Lemhi County, Idaho.
truei, Allen, 1894, Bull. Amer. Mus. Nat. Hist. VI, p. 331. Laramie County, Wyoming.
oramontis, Rhoads, 1895, Amer. Nat. vol. XXIX, p. 941. Mount Baker Range, British Columbia.
preblei, Merriam, 1897, Proc. Biol. Soc. Washington, XI, p. 45. Twin Peak, Boulder County, Colorado.
constablei, Allen, 1899, Bull. Amer. Mus. Nat. Hist. XII, p. 4. Telegraph Creek, British Columbia.

2. PHENACOMYS INTERMEDIUS CELSUS, Howell

1923. Proc. Biol. Soc. Washington, XXXVI, p. 158.
Muir Meadow, Tuolumne Meadows, Yosemite National Park, California.

3. PHENACOMYS INTERMEDIUS LEVIS, Howell

1923. Proc. Biol. Soc. Washington, XXXVI, p. 157.
Saint Mary's Lake, Teton County, Montana.

4. PHENACOMYS INTERMEDIUS OLYMPICUS, Elliot

1899. Field. Columb. Mus. publ. 30, zool. ser. vol. 1, p. 225.
Happy Lake, Olympic Mountains, Challam County, Washington.
Synonym: *pumilus*, Elliot, 1899, Field Col. Mus. publ. 30, zool. ser. 1, 226. Same locality.

ungava Group

5. PHENACOMYS UNGAVA UNGAVA, Merriam

1889. North Amer. Fauna, no. 2, p. 35.
Fort Chimo, Ungava, Canada.
Synonym: *celatus*, Merriam, 1889, North Amer. Fauna, no. 2, p. 33. Godbout, Quebec.
latimanus, Merriam, 1889, North Amer. Fauna, no. 2, p. 34. Fort Chimo, Ungava.

6. PHENACOMYS UNGAVA CRASSUS, Bangs

1900. Proc. New Eng. Zool. Club, 2, p. 39.
Rigolet, Hamilton Inlet, Labrador, Canada.

7. PHENACOMYS MACKENZII, Preble

1902. Proc. Biol. Soc. Washington, XV, p. 182.
Fort Smith, Slave River, Mackenzie, Canada.

albipes Group

8. PHENACOMYS ALBIPES, Merriam

1901. Proc. Biol. Soc. Washington, XIV, p. 125.
Redwoods, near Arcata, Humboldt Bay, Humboldt County, California.

longicaudus Group

9. PHENACOMYS LONGICAUDUS, True

1890. Proc. U.S. Nat. Mus. XIII, p. 303.
Marshfield, Coos County, Oregon.

10. PHENACOMYS SILVICOLA, Howell

1921. Journ. Mamm. Baltimore, 2, p. 98.
5 miles south-east of Tillamook, Tillamook County, Oregon.

Genus 13. DOLOMYS, Nehring

1898. DOLOMYS, Nehring, Zool. Anz. 21, p. 13. (First recognized as a living genus by Hinton, 1925, Proc. Linn. Soc. London, 1924–25, p. 36.)

TYPE SPECIES.—*Dolomys milleri*, Nehring (a fossil species).

RANGE.—South-eastern Europe; known from Montenegro, Greece, Yugoslavia.

NUMBER OF FORMS.—Three are described up to 1936.

CHARACTERS.—Skull with the interorbital ridges fusing in adult; squamosal crests moderate; jugal rather broad in the few seen. Bullae very large and inflated; mastoids not much inflated. Palate approaching that of *Microtus* in structure, but the median septum is short and broad. Upper incisors broad, faintly grooved. Cheekteeth rooted in adult. M.1, M.2 normal; M.3 with anterior loop, three triangles of which the anteroexternal is confluent with the anterior loop, and very small, and a large closed off posterior loop. M.1 lower with five closed triangles between the terminal loops; M.2, M.3 normal.

Plantar pads 6. Tail long, more than half length head and body, not well haired; ear relatively large; digits normal; sole mostly naked.

Forms seen: *bogdanovi*, *marakovici*, *korabensis* (*D. grabenscikovi korabensis*, Martino, 1937, from Yugoslavia), *preniensis* (*D. bogdanovi preniensis*, Martino, 1939).

List of Named Forms

1. DOLOMYS BOGDANOVI BOGDANOVI, Martino

1922. Ann. Mag. Nat. Hist. 9, IX, p. 413.
Cetinje, Montenegro.

2. DOLOMYS BOGDANOVI MARAKOVICI, Bolkay

1924. Biol. Hung. 1, fasc. 2, p. 4.
Bjelasnica Mountains, Bosnia.

3. DOLOMYS GRABENSCIKOVI, Martino

1935. Zap. Russk. Inst. Belgrad, 10, p. 84.
Bistra Mountains, Macedonia.

Genus 14. ORTHRIOMYS, Merriam

1898. Orthriomys, Merriam, Proc. Biol. Soc. Washington, XII, p. 106.

Type Species.—*Microtus umbrosus*, Merriam.

Range.—Mount Zempoaltepec, Oaxaca, Mexico.

Number of Forms.—One.

Characters.—Skull with supraorbital ridges fused to form median crest in adult. Bullae relatively small. Palate posteriorly as in *Microtus*. Cheekteeth evergrowing; M.1, M.2 normal in elements; M.3 with the inner folds reduced to two, the posterior loop moderate. Lower cheekteeth: in both skulls examined M.1 has three closed triangles in front of the posterior loop; in front of these the fourth and fifth triangles are nearly confluent; the anterior loop is reduced. According to Hinton, the number of closed triangles in M.1 lower varies individually in this genus, between three and five (the same peculiarity applying to the related *Herpetomys*). M.2 with posterior loop, two closed triangles, and an anterior loop composed of two confluent triangles. M.3 with posterior loop, two closed triangles, and anterior loop.

Tail about half head and body length. Ear relatively large. Fur soft. Plantar pads 5 (a rudimentary sixth may be present). Mammae 2—0=4.

Forms seen: *umbrosus*.

List of Named Forms

1. ORTHRIOMYS UMBROSUS, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 107.
Mount Zempoaltepec, Oaxaca, Mexico.

Genus 15. HERPETOMYS, Merriam

1898. Herpetomys, Merriam, Proc. Biol. Soc. Washington, XII, p. 107.

Type Species.—*Microtus guatemalensis*, Merriam.

Range.—Mountains of Guatemala.

Number of Forms.—One.

Characters.—Like *Orthriomys*, but bullae larger, not reduced; M.3 as in normal *Microtus*, in the one skull seen, with three inner folds; M.2 lower evidently normal (posterior loop, four alternating triangles) and the tail shortened, about a third head and body length. Mammae 2—1=6, the inguinal pair functionless.

Forms seen: *guatemalensis*.

List of Named Forms

1. HERPETOMYS GUATEMALENSIS, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 108.
Todos Santos, Huehuetenango, Guatemala.

Genus 16. MICROTUS, Schrank

1798. Microtus, Schrank, Fauna Boica, vol. 1, abth. 1, p. 72.
1894. Tetramerodon, Rhoads, Proc. Acad. Nat. Sci. Philadelphia, p. 282. (*Arvicola tetramerus*, Rhoads.)
1914. Alexandromys, Ognev, Moskva Dnev. Zool. otd. obsc. liub. jest. T. ii, p. 109. (*Microtus pelliceus*, Thomas.)
1933. Sumeriomys, Argyropulo, Zeitschr. für Säugetierk. 8, p. 180. (*Microtus socialis*, Pallas.)
1908. Chionomys, Miller, Ann. Mag. Nat. Hist. 8, I, p. 97. (*Arvicola nivalis*, Martins.)
1894. Aulacomys, Rhoads, Amer. Nat. XXVIII, p. 182. (*Aulacomys arviculoides*, Rhoads.) Valid as a subgenus.
1901. Stenocranius, Kastschenko, Ann. Mus. St. Petersb. vi, p. 167. (*Microtus slowzowi*, Poljak.) Valid as a subgenus.
1857. Chilotus, Baird, Mamm. North Amer. p. 516. (*Arvicola oregoni*, Bachman.) Valid as a subgenus.

Type Species.—*Microtus terrestris*, Schrank=*Mus arvalis*, Pallas.

Range.—Holarctic region, from England, Spain, and Norway to Japan and the Pacific coast, and from Alaska and Lower California to the Atlantic coast of North America. North into the Arctic region of both hemispheres. South to Spain, Northern Italy, Greece, Asia Minor, Syria, Palestine; Libya; Transcaucasia, Persia, Russian Turkestan, Chinese Turkestan, Szechuan, Yunnan, Eastern China north of the Yangtsekiang; and in America to Southern Mexico.

In Western Europe, the *agrestis* group ranges in England, Scotland, the Hebrides, Norway, Sweden, Denmark, Germany, France, Spain, North Italy, Finland, Estonia, Yugoslavia; the *arvalis* group in Ireland (fossil),[1] the Orkneys, Channel Islands, Spain, France, Belgium, Switzerland, North Italy, Germany,

[1] Part of one skull only has been found fossil in an Irish cave; but remains of Lemmings are abundant there.

Hungary, Serbia, Roumania, Bulgaria, Greece, but not Scandinavia; the *oeconomus* group in Norway, Sweden, Finland, Holland, Germany, and Hungary; and the *nivalis* group from Spain, Switzerland, France, North Italy, South Germany, Transylvania, Yugoslavia; also the *guentheri* group is represented in Greece and perhaps Spain. In South-west Asia, *arvalis* is known from Asia Minor; *socialis* from Persia; *roberti* from Asia Minor; the *nivalis* group from Asia Minor, Syria, and Palestine; and the *guentheri* group from Asia Minor, Palestine, and North Africa (Libya). In the U.S.S.R., the *oeconomus* group ranges through North and Central European part, south to Kiev and Voronej, the Ural Mountains, and the whole of Siberia (northern and central) to the Pacific coast; also in Semirechyia and the Amur district; the *agrestis* group has a similar range to the last in European Russia, and also occurs in the Yenesei Valley, and east to Lake Baikal; the *arvalis* group ranges through the European part, except extreme north, and south to Crimea, Caucasus; Ural; Kazakstan, and Southern Turkestan; the Altai; also represented in Transbaikalia; the *calamorum-michnoi* group is from Transbaikalia, Amur, Ussuri, etc.; *middendorffi* is from North and Mid-Ural, Ob and Yenesei regions; the *gregalis* group ranges from the Ural more or less throughout Northern Siberia; also North Kazakstan, Semirechyia, the Altai, Transbaikalia, and Amur region; *socialis* is known from Crimea, Ukraine, Caucasus, Lower Ural, North Caspian region, Kopet-Dag, Aral region, Fergana, Semirechyia; *roberti* group, and *nivalis* group, Caucasus (details compiled from Vinogradov). In China, *agrestis* is known from Mongolia, the *arvalis* group, from Mongolia, Kansu, Korea, Japan and the Kuriles; *gregalis* group from Mongolia and Chinese Turkestan; *calamorum* group from Manchuria, Kiangsu, Shensi, and Yunnan; *millicens* from Szechuan; and *mandarinus* group from Shansi, Mongolia, and Chihli. In America, the *pennsylvanicus* group ranges from Labrador and North Carolina westwards more or less continuously apparently to Alberta, Montana, Colorado, and New Mexico; a form is described from Admiralty Island, Alaska; the *montanus* group is western, from Arizona and Wyoming to California and Southern British Columbia; *californicus* group is Californian; *operarius* group, from Alaska and Mackenzie; *abbreviatus* group—Alaska; *townsendi* group, from coastal Oregon, California, British Columbia; *longicaudus* group, from Washington to South Dakota, and south to California and Arizona; forms also named from islands off Alaska; *mexicanus* group from Arizona, Texas, and Mexico; *xanthognathus* group from Central Alberta north to Arctic coast, west to Central Alaska; *chrotorrhinus* group from New Hampshire, New Brunswick, Quebec, Labrador; *richardsoni* group from Washington, British Columbia, Idaho, Oregon, Alberta, Wyoming; and *oregoni* group from Oregon, California, Washington, British Columbia.

Number of Forms.—I have listed two hundred and thirty-eight. A few of these are doubtful, or may belong to other genera. One is named from Formosa.

Characters.—Compared with more normal Muridae, the skull is much more angular, and more specialized by ridges for jaw-muscle attachment. The rostrum is rather short; the frontals considerably constricted. The supraorbital ridges fuse in the adult to form a median interorbital crest, "sooner or later" (Hinton). Some forms, as noted below, appear to have this

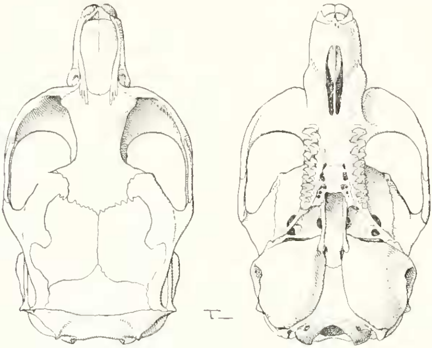

FIG. 45. MICROTUS AGRESTIS AGRESTIS, Linnaeus.
B.M. No. 98.5.2.9, ♂; × 2½.

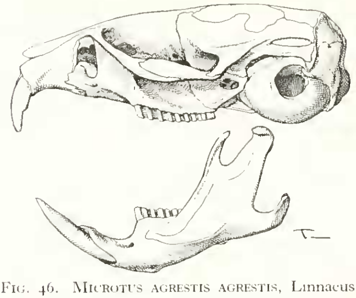

FIG. 46. MICROTUS AGRESTIS AGRESTIS, Linnaeus.
B.M. No. 98.5.2.9, ♂; × 2½.

specialization taking place very late in life, or perhaps even not at all. The squamosals have more or less well-developed crests. The interparietal is not reduced, and may be large. The braincase is broad.

I have seen no skulls of members of the *guentheri* group with the median crest developed. Hinton, writing of *M. mustersi*, states that they probably do so, and that the allied species *philistinus* and *lydius* are based on sub-adult material. In *socialis*, according to Vinogradov, they do not do so, "even in old specimens." In *roberti* and *nivalis*, the supraorbital ridges are weak; very few skulls have been examined in which a median crest is present; but ultimately the ridges in these forms do fuse, as I have seen specimens of both with them actually fused. It is important to note this, as Argyropulo in his key to Palaearctic subgenera of *Microtus* states that the ridges in these forms do not fuse (referring to subgenus "*Chionomys*").

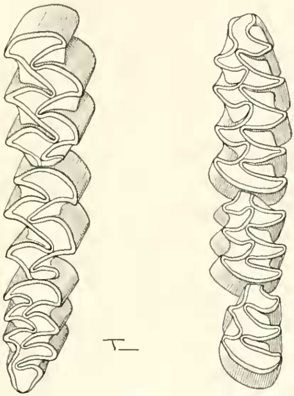

FIG. 47. MICROTUS AGRESTIS AGRESTIS, Linnaeus.
B.M. No. 98.5.2.9, ♂; × 12.

The zygoma is robust. The zygomatic plate is very broad, with the superior border strongly ridged, and is strongly tilted upwards. The infraorbital foramen is much narrowed. The bullae are never reduced. They are usually relatively large, and there is a tendency towards considerable inflation in the *guentheri* group, and in *socialis*. These two groups have been referred to a special subgenus *Sumeriomys* by Argyropulo, based largely on this, and on the fact that the median interorbital crest is not developed (see remarks above); but the *guentheri* group seem to be sufficiently near the *arvalis* group for this division not to be maintained. According to Argyropulo, also the plantar pads are reduced to five in his *Sumeriomys*; but this character is not unknown elsewhere within the genus.

The palatal foramina are medium in length as a rule, and often narrowed. The palate terminates posteriorly in a sloping median ridge and two lateral pits, the "median spinous process always present, converted into a sloping septum between the posterolateral pits, the inner borders of these pits always continuous with the tip or sides of the median process" (Hinton). This arrangement is least typical in the highly aberrant Chinese species, *millicens*, the peculiarities of which will be dealt with below. The incisors are broad and relatively heavy; they are plain except in rare individual cases; I once picked up a dead *M. agrestis* in my garden which had grooved upper incisors, which is I believe very rare.

Cheekteeth evergrowing. The normal dentition, as typified by *arvalis*, is as follows. M.1 has an anterior loop, and four alternating closed triangles. M.2 has an anterior loop, and three closed triangles, two external, one internal. M.3 has an anterior loop, three alternating triangles, as in M.2, and then a posterior loop, the inner side of which is cut by a deep re-entrant fold; this tooth is longer than M.2, and has three clear inner re-entrant folds. The teeth are always subject to slight individual variations, but this pattern is common to most normal members of the genus both in the Old World and, as far as I can see from Bailey's figures, the American species, except those noted below.

In *M. agrestis*, and the *pennsylvanicus* group, M.2 has a clear but small posterointernal extra closed triangle. (There may be traces of this formation in M.1.) While this character differentiates between the *agrestis* and *arvalis* groups clearly in the northern Palaearctic, some species, such as the southern *socialis*, may have the character in M.2 present or absent.

M.3 is normal, as a rule, in most of the species, but in two Old World species it is very complex; and in three groups it is simplified. The complex types are *middendorffi* (of which I have seen few), which has an extra pair of closed triangles behind the normal ones, and four inner folds; and *roberti*, which has in this tooth a straight anterior fold, five closed triangles, and a long posterior loop with a slight re-entrant fold in it. *M. gud* also, judging by B.M. material (few), has a complex M.3.

In the American *chrotorrhinus*, M.3 is also said to have five closed triangles.

This tooth is reduced in the *nivalis* group, having only two inner folds. Similar reduction has taken place in the Chinese *mandarinus* group, the posterior loop being very short in these forms (*johannes* and *pullus*).

In *millicens*, a little-known species from Szechuan which differs from all other *Microtus* examined in its unusually flat skull (suggestive of *Platycranius*), M.3 is apparently variable in form, three specimens having a reduced posterior loop, and only two re-entrant folds, and two from the same locality evidently taken at the same time having quite a normal M.3, with three inner folds.

A few seen of the American *mexicanus* have this tooth rather reduced posteriorly; and the tooth is said to be not quite normal in the American *abbreviatus* group.

Lower teeth. The typical pattern is: M.1 with posterior loop, five alternating triangles, and an anterior loop, with a fold in it each side. In some forms, these folds may be obsolete. In a few specimens seen of *M. transcaspicus ilaeus*, the above-mentioned folds meet, so that there are seven closed triangles in this tooth. M.2 with posterior loop and four alternating closed triangles. M.3 with three transverse loops (normally no closed triangles); the inner folds deep, the outer ones usually weak. This pattern is normally very constant through the genus, as far as seen, with the following exceptions: in the *oeconomus* group, and the American *operarius*, there are only four closed triangles to M.1 lower, the fifth (anterointernal) triangle is confluent with the anterior loop, which is reduced. While this character differentiates the *oeconomus* Voles from other northern species, it is not a constant character in those forms referred by Russian authors to *Chionomys*; the anterointernal triangle in *roberti* and in *nivalis* may be either confluent with the anterior loop, or closed off from it. In *millicens*, there are only four closed triangles in M.1 lower.

External characters: mammae (so far as known), 2—2=8 except in the *mexicanus* group, in which they are reduced to 1—1=4. The plantar tubercles are normally six, but may be reduced to five in subgenus *Aulacomys*, subgenus *Chilotus*, and the *socialis* group, also according to Argyropulo in the *guentheri* group. Bailey states that in the American species there are glands present on the hips or flanks. Ears not specially reduced, except as noted below. Tail usually short, considerably less than head and body length, usually less than half this measurement, but not excessively reduced; well haired. Sole not heavily haired as a rule. Digits not abnormal. Claws in the majority not tending to become enlarged. *M. michnoi* may be noted as a large species, with a long tail (about half head and body length). *M. nivalis* and allies also have a long tail (about half head and body length), and rather large ears. In *M. roberti*, the tail may approach three-quarters head and body length, and is sometimes poorly haired for a member of this group. *M. mordax* (*longicaudatus*) group, and *M. townsendi* group have a long tail, among the American species. The claws tend to become rather prominent in the subgenus *Stenocranius*; and they may be considerably enlarged in the *mandarinus* group, which combined with its reduced third molar seems to blend into the genus *Lasiopodomys*, and make it not easy to retain the latter. In this group (*mandarinus*), the ear is rather strongly reduced. In *M. philistinus* the ear is more reduced than usual. *M. middendorffi* has a shorter tail than is normal, as have the *abbreviatus* group from America, according to Bailey. Other long-tailed types are members of the subgenus *Aulacomys* (rather large forms), and *M. millicens*.

Groups and Subgenera: Hinton has not yet given his views as to which subgenera should be retained in this genus.

STENOCRANIUS is currently accepted for the *gregalis* group, which have a normal dentition, but an unusually narrowed skull; there is a sharp median crest formed; the whole skull appears excessively narrowed throughout.

CHILOTUS, originally proposed for the American *oregoni* group, is given generic rank by Hinton, who quotes species from Asia (*socialis* group?) and North America. It is given subgeneric rank only by American authors. Its characters appear to me to be duplicated by one or other of the species of the genus, and I do not see at the moment how it is to be retained as a full genus. The ears are said to be rather small (though not smaller than those of *Microtus philistinus*), the plantar pads are reduced to five. But this character is present in members of the *Microtus guentheri* group, according to Argyropulo, which species Mr. Hinton tells me he regards as closely allied to *arvalis*. The mastoids tend to be inflated, another character shared by the *guentheri* group. The fur is described as "short and dense, without any admixture of stiff hairs," but I can detect no difference between the fur of these species and *Microtus* that could be of generic rank; in fact quality of fur (compare the genus *Rattus*) appears to be a highly changeable character in members of this Order.

The skull is described as being flattened; but is certainly less so than in *Microtus millicens*. The median crest is, according to Hinton, developed in the adult, in which character the American species stands nearer typical *Microtus* than do *socialis* and perhaps the *guentheri* group. The claws are not enlarged. Another member of *Microtus* which shares the characters of five plantar pads is *M. richardsoni* (subgenus *Aulacomys*); this character cannot, I think, be regarded as generic; for instance, within *Neodon* five or six may be present in different species.

The group was defined by Bailey as follows: "Plantar tubercles 5; mammae 8 (2 pectoral, 2 inguinal), side glands obscure or wanting; ears rather small; fur dense, without stiff hairs; skull short, low, and with elliptical braincase; molars small. . . ."

The dentition is normal.

AULACOMYS is regarded as a valid subgenus by American authors; Bailey described it as follows: "Plantar tubercles five. Side glands in flanks of males conspicuous; a musk-bearing anal gland. Mammae 2—2=8. Feet large; tail long, fur full and long; bullae very small. Incisors projecting far beyond premaxillae. Molars with constricted and tightly closed sections." Bailey used the name *Arvicola* for this group, but *Arvicola* being restricted now to the Palaearctic Water-Voles, the name *Aulacomys* has been revived.

The subgenus *Chionomys* of Miller is disregarded at the moment in the present classification, at any rate until the whole of the Palaearctic *Microtus* has been revised. It was based on the following characters: "In general like the subgenus *Microtus*, but third upper molar with only two re-entrant angles on each side, as in *Arvicola* and some forms of *Pitymys*; skull with broad rather flat smooth braincase, and wide interorbital region, the temporal ridges low and inconspicuous; posterior termination of palate essentially as in true *Microtus*, but with elements usually less well defined."

This group was based on *nivalis*. Russian authors combine *M. roberti* with *nivalis* in this subgenus. But *roberti*, though like *nivalis* in external characters (long tail, large ears, etc.), is precisely at the other end of the genus as regards the formation of its M.3, which is very complex, more so than in other Palaearctic Voles except perhaps *middendorffi*. The skull (relatively weak temporal ridges, etc.) is *nivalis*-like. But if *Chionomys* is based primarily on a form in which M.3 is simplified, it seems to me to stand to reason that it cannot also include a form with a most complex M.3. *Chionomys* could be restricted to the *nivalis* group, but in at least two other Palaearctic groups there is tendency to reduction of M.3 (in *mandarinus* group it is more reduced than in the *nivalis* group; in *millicens*, as already noted, it is not a constant character, some specimens having M.3 like *nivalis*, others like *arvalis*); while both *millicens* and the *mandarinus* group seem to me to be more aberrant than *nivalis*, either in cranial characters (*millicens*), or external characters (*mandarinus* group). In these circumstances, it seems that unless these two groups receive new subgeneric names, *Chionomys* must be dropped. It must be added also that whereas the temporal ridges in *nivalis* group are certainly weak, they appear even weaker in *socialis* and the *guentheri* group. Vinogradov evidently attaches no importance to the differences in M.3 between *nivalis* and *roberti*; the form *gud*, with a complex M.3, is listed as a race of *nivalis* by that author. Other races of *nivalis* of Russian authors, under the circumstances, must be accepted provisionally; some of these might have a complex M.3, in which case they could probably be regarded as races of *gud*. (I have seen very few specimens from the Caucasus, and area.)

American forms: Apart from the subgenera *Chilotus* and *Aulacomys*, Bailey divides the *Microtus* of North America into the following ten groups (North American Fauna, no. 17, 1900; revision of the genus *Microtus*):

pennsylvanicus group, characterized by "a posterior fifth loop to the middle upper molar" (evidently representing the Palaearctic *agrestis* group).

montanus group, characterized by "moderately short tail and constricted incisive foramina."

townsendi group, characterized by "large size, long tail, and dark brown colour."

californicus group, characterized by "large size, and wide open incisive foramina."

longicaudus group, characterized by "long tail and grey colour."

mexicanus group, characterized by "short tail, brown colour, and only four mammae."

operarius group, characterized by "short tail, and only four closed triangles on anterior lower molar"; evidently representing the Palaearctic *oeconomus* group.

abbreviatus group, characterized by "robust form, very short tail, five closed triangles on M.1 (lower), and two closed, one open on posterior upper molar."

chrotorrhinus group, characterized by "yellow nose, and five closed triangles to posterior upper molar."

xanthognathus group, characterized by "yellow nose, glands on flanks, and three closed triangles to posterior upper molar." (In the other species, according to Bailey, the glands are on the hips.)

According to Nelson, 1931, the species *innuitus* (referred by Bailey to the *operarius* group), *abbreviatus* and *miurus*, together with the new Alaskan species *muriei*, belong to the subgenus *Stenocranius*. No members of these Alaskan species have been examined.

Palaearctic groups. From the material examined, there appear to be about twelve groups in the Palaearctic region. This arrangement must be accepted as provisional.

1. *gregalis* group (subgenus *Stenocranius*); with the cranial characters already indicated, and normal dentition. Vinogradov recognizes two species only in U.S.S.R., *gregalis* and *major*, the other forms being regarded by this author as races of *gregalis*. The claws, in specimens examined, often tend to be rather prominent; the ear may be rather small. The other forms must provisionally be regarded as belonging to subgenus *Microtus* s.s.; though it seems to me that very possibly the *Stenocranius* forms are more closely related to the other northern "strong-skulled" *Microtus* (*agrestis*, *arvalis*, *oeconomus*, etc.), than these are to the "weak-skulled" types like *nivalis*, *guentheri*, *roberti*, and *socialis*.
2. *millicens* group. This is a highly aberrant species. The four closed triangles on M.1 lower prove it to belong here rather than with *Neodon* (to which its external characters show some likeness), according to Hinton's classification. The tail is rather long. There are six plantar pads. The skull is very weakly ridged, and extremely depressed and flattened, suggesting a type which lives under rocks. M.2 is more or less with the peculiarity of *Microtus agrestis* (i.e. an extra posterointernal triangle), or strong traces of it. M.3 is, as indicated, either like *nivalis*, or like *arvalis*, varying evidently in different specimens from the same locality. The fifth triangle in M.1 lower is confluent with the anterior loop, as in *oeconomus*, and sometimes *nivalis*, *roberti*. The species is from Szechuan. It will probably have to receive a subgeneric name later. The posterior palate does not seem quite normal.
3. *mandarinus* group, based chiefly on *johannes* and *pullus*. This group stands near *Lasiopodomys*, making it difficult to retain that genus. The third molar is strongly reduced in all seen, with only two inner folds. The skull is quite angular, and normal. Sometimes the foreclaws tend to be nearly as enlarged as in *Lasiopodomys*, though this is not a constant character. The sole is much less hairy than normal in *Lasiopodomys*, and the general external appearance very different. The ear is strongly shortened.

   This is an isolated Chinese group, which does not seem very typical in *Microtus*.

The remaining species have three inner folds in M.3, except in *nivalis*, and are less aberrant than those above.

4. *socialis* group. With five plantar pads; relatively large bullae; normal *arvalis* dentition; the skull is weak, and the median ridges according to Vinogradov do not fuse to form a median crest. The ear is not specially shortened, though this has been regarded as a more or less fossorial species; the claws are not enlarged. In some forms, as the type of *irani* from Persia, and the race *paradoxus*, M.2 is as in *agrestis*; in other forms, the dentition is of normal *arvalis* type. A southern group; from South Russia, Turkestan, and Persia.

5. *guentheri* group. According to Argyropulo, five plantar pads may be present in this group. This author states that these Voles are more or less fossorial; some specimens of *guentheri* in the London Zoological Gardens at present do not give this impression, being very active, alert and diurnal, and behaving in a very different manner from captivity Rodents which may be regarded as fossorial (at least so far as my experience goes). Thus they show no desire for darkness; the eyes are not reduced; and they are exceedingly fast-moving. The median interorbital crest in this group develops late according to Hinton, though, as already mentioned, no material has been seen with this specialization present. The dentition is normal, of *arvalis* type. The bullae tend to be enlarged. Apparently *philistinus* has a more reduced ear than is normal in the genus. Apart from this, and the African species, all named forms appear to me to belong to one species. *M. cabrerae*, from Spain, a little-known form, may also perhaps be referred here, as suggested by Argyropulo. This is also a southern group, from Greece, Asia Minor, Syria, Palestine, Libya. The size is often rather larger than *arvalis*, to which the group is probably not distantly allied.
6. *roberti* group. Another species with weak skull, the median interorbital crest developing very late. Tail long, about half head and body length or more. M.3 very complex. M.1 lower may have four or five closed triangles. Asia Minor, Caucasus.
7. *nivalis* group. Agreeing with *roberti* in the relatively weak skull, and the long tail; but M.3 simpler than other species, with only two inner folds; M.1 lower as in *roberti*. This is also more or less southern in range: from Syria and the Caucasus; as well as mountains of Central and Southern Europe.

The following are generally with the median interorbital crest fully developed comparatively early, and the skull more or less angular; for the most part they are northern in range.

8. *middendorffi* group. With very short tail (about a quarter head and body length). M.3 is more complex in *middendorffi* than is normal. Perhaps *hypoboreus* of Vinogradov belongs here, though as figured, M.3 is normal. It differs from *middendorffi* in cranial characters.

The remaining species have a less strongly shortened tail.

9. *oeconomus* group. M.1 lower with only four closed triangles. All forms occurring in U.S.S.R., including *ratticeps*, are regarded as races of *oeconomus* by Vinogradov.
10. *agrestis* group. M.1 lower normal. M.2 with extra posterointernal triangle. (As noted elsewhere, this character may occur individually in other species, such as *socialis*; but it seems a constant character on which to divide the more normal Voles of Northern Europe and Asia.)
11. *arvalis* group. M.2 normal. Dentition normal.
    In this group may be included *arvalis*, *transcaspicus*, *orcadensis* and

other species admitted by Miller from Western Europe in the group as understood by this author, except probably *hartingi* and *cabrerae* (which are referred to *guentheri* group), the Chinese *mongolicus*, and the Japanese *montebelloi*.

12. *calamorum* group. An East Asiatic group with the dentition of the last, tending to become larger. Provisionally including *clarkei* from Yunnan (in which M.2 in the type specimen is of *agrestis* type), *calamorum*, *ungurensis*, *michnoi*, a long-tailed species (including *pelliceus*, type of Ognev's genus "*Alexandromys*"), and possibly *fortis*, not seen. There seems to be a tendency in this group for the lateral pits at the back of the palate to be larger than is usual. The head and body length is typically about 125, or more (up to 170 in *michnoi*, according to Vinogradov). Plantar pads 5 (*calamorum*, *clarkei*, *pelliceus*). This character suggests that the group should be referred to the Nearctic Subgenus *Aulacomys*.

The present classification is based largely on the work of Bailey, Miller, and Vinogradov, whose work has been carefully studied, and has lessened my labours considerably. Mr. Chaworth-Musters has also kindly given me his views on some of the Chinese species.

There is considerable difference of opinion among authors as to the limits of this genus. American authors class *Pedomys*, *Orthriomys*, and *Herpetomys* as subgenera of *Microtus*, as well as those forms here retained in the genus. As already stated, Hinton gives generic rank to *Chilotus*, which is currently regarded as a subgenus of *Microtus* only, and is here retained as such, as intermediate forms leading apparently from one to the other into the *arvalis* group exist between typical *Microtus* and *Chilotus*.

Vinogradov includes *Pitymys* in *Microtus*, as a subgenus; while several Russian forms he refers to *Phaiomys* (also as a subgenus), these corresponding to the genera *Lasiopodomys*, *Neodon*, and *Blanfordimys* of the present classification. *Phaiomys* has been restricted by Hinton to the fossorial Chinese and Indian species, and full generic rank is given by this author to *Lasiopodomys* and *Neodon*. The genera *Neodon*, *Phaiomys*, *Pedomys* and *Blanfordimys* all differ from *Microtus* in having only three closed triangles to the first lower molar (in which they agree with *Arvicola* and *Pitymys*); this character appears to be constant in the forms examined of these genera. Vinogradov also recognizes *Stenocranius* and *Chionomys* as subgenera (the latter as indicated above including *roberti* as well as its type, *nivalis*). I have already given reasons for the opinion that this classification is incorrect.

Forms seen: *agrestis*, *angularis*, *angustus*, *aquitanius*, *arcturus*, *arvalis*, *arviculoides*, *asturianus*, *bailloni*, *brauneri*, *breweri*, *cabrerae*, *calamorum*, *calypsus*, *clarkei*, *drummondi*, *duplicatus*, *dutcheri*, *edax*, *enixus*, *eversmanni*, *exsul*, *fontigenus*, *fulviventer*, *gud*, *guentheri*, *hartingi*, *hirtus*, *ilaeus*, *incertus*, *irani*, *johannes*, *leucurus*, *lebrunii*, *levernedii*, *levis*, *luch*, *lydius*, *macrocranius*, *macrurus*, *macgillivraii*, *malcolmi*, *mandarinus*, *meridianus*, *mexicanus*, *mial*, *michnoi*, *middendorffi*, *millicens*, *modestus*, *mongol*, *mongolicus*, *montebelloi*, *mordax*, *mustersi*, *mystacinus*, *nanus*, *neglectus*, *nivalis*, *obscurus*, *oeconomus*, *orcadensis*, *oregoni*, *parvus*, *pelliceus*, *pennsylvanicus*, *philistinus*, *pontius*, *pullus*, *raddei*, *ratticeps*, *ravidulus*, *riparius*, *roberti*, *rossiaemeridionalis*, *rozianus*, *sandayensis*, *sarnius*, *serpens*, *slowzowi*, *superus*, *socialis*, *terraenovae*, *tianschanicus*, *townsendi*, *transcaucasicus*, *ulpius*, *ungurensis*, *xanthognathus*, *westrae*, *wagneri* (*M. nivalis wagneri*, Martino, 1939).

List of Named Forms

Nearctic Forms

Subgenus *Chilotus*, Baird

1. MICROTUS OREGONI OREGONI, Bachman

1839. Journ. Acad. Nat. Sci. Philadelphia, VIII, p. 60.
Astoria, Clatsop County, Oregon.
Synonym: *morosus*, Elliot, 1899, Field Col. Mus. Zool. 1, 11, p. 227. Olympic Mountains, Washington.

2. MICROTUS OREGONI ADOCETUS, Merriam

1908. Proc. Biol. Soc. Washington, XXI, p. 145.
S. Yolla Bolly Mountain, Tehama County, California.

3. MICROTUS OREGONI CANTWELLI, Taylor

1920. Journ. Mamm. Baltimore, 1, p. 180.
Glacier Basin, Mount. Rainier, Pierce County, Washington.

4. MICROTUS SERPENS, Merriam

1897. Proc. Biol. Soc. Washington, XI, p. 75.
Agassiz, British Columbia, Canada.

5. MICROTUS BAIRDI, Merriam

1897. Proc. Biol. Soc. Washington, XI, p. 74.
Glacier Peak, Crater Lake, Klamath County, Oregon.

Subgenus *Aulacomys*, Rhoads

6. MICROTUS RICHARDSONI RICHARDSONI, de Kay

1842. Zool. New York Mamm. p. 91.
Near the foot of the Rocky Mountains.

7. MICROTUS RICHARDSONI ARVICULOIDES, Rhoads

1894. Amer. Nat. XXVIII, p. 182.
Lake Keechelus, Kittitas County, Washington.
Synonym: *principalis*, Rhoads, 1895, Amer. Nat. XXIX, p. 940. Mount Baker Range, British Columbia.

8. MICROTUS RICHARDSONI MACROPUS, Merriam

1891. North Amer. Fauna, no. 5, p. 60.
Pahsimeroi Mountains, Custer County, Idaho.

Subgenus *Microtus*, Schrank

pennsylvanicus Group

(corresponding to the Old World *agrestis* Group)

9. MICROTUS PENNSYLVANICUS PENNSYLVANICUS, Ord

1815. Guthries Geogr. 2d. Amer. ed. vol. 2, p. 292.
Meadows below Philadelphia, Pennsylvania.
Synonym: *pratensis*, Rafinesque, 1817, Amer. Monthly Mag. II, 45.
noveboracensis, Rafinesque, Ann. Nat. 3, 1820.

(*Microtis pennsylvanicus pennsylvanicus*) *riparius*, Ord, J. Acad. Nat. Sci. Philadelphia, IV, II, 305 1825.
palustris, Harlan, Fauna Amer. 136, 1825.
hirsutus, Emmons, Rept. Quadr. Mass. 60, 1840.
alborufescens, Emmons, same reference.
fulva, Audubon & Bachmann, Proc. Acad. Nat. Sci. Philadelphia, I, 96, 1841.
nasuta, Audubon & Bachman, same reference.
rufescens, de Kay, Zool. N. Y. Mamm. 1, 85, 1842.
oneida, de Kay, same reference.
dekayi, Audubon & Bachman, Quadr. N. Amer. III, 287, 1854.
longipilis, Baird, Mamm. North Amer. 524, 1857.
rufidorsum, Baird, same reference, p. 526.

10. MICROTUS PENNSYLVANICUS NIGRANS, Rhoads
1897. Proc. Acad. Nat. Sci. Philadelphia, p. 307.
Currituck, Currituck County, N. Carolina.

11. MICROTUS PENNSYLVANICUS ACADICUS, Bangs
1897. Amer. Nat. XXXI, p. 239.
Digby, Nova Scotia, Canada.

12. MICROTUS PENNSYLVANICUS SHATTUCKI, Howe
1901. Proc. Portland Soc. Nat. Hist. 2, p. 201.
Tumble Down Dick Island, Long Island, Penobscot Bay, Maine.

13. MICROTUS PENNSYLVANICUS MODESTUS, Baird
1857. Mamm. North Amer. p. 535.
Cochetopa Pass, Saguache County, Colorado.
Synonym: *insperatus*, Allen, 1894, Bull. Amer. Mus. Nat. Hist. VI, 347. Custer, Black Hills, S. Dakota.

14. MICROTUS PENNSYLVANICUS WAHEMA, Bailey
1920. Journ. Mamm. Baltimore, I, p. 72.
Glendive, Dawson City, Montana.

15. MICROTUS PENNSYLVANICUS FONTIGENUS, Bangs
1896. Proc. Biol. Soc. Washington, X, p. 48.
Lake Edward, Quebec, Canada.

16. MICROTUS PENNSYLVANICUS LABRADORIUS, Bailey
1898. Proc. Biol. Soc. Washington, XII, p. 88.
Fort Chimo, Ungava, Canada.

17. MICROTUS PROVECTUS, Bangs
1908. Proc. New Eng. Zool. Club, 4, p. 20.
Block Island, Newport County, Rhode Island.

18. MICROTUS DRUMMONDI, Audubon & Bachman
1854. Quadr. North Amer. vol. 3, p. 166.
Valleys of the Rocky Mountains; probably in vicinity of Jasper House, Alberta, Canada.
Synonym: *microcephalus*, Rhoads, 1894, Proc. Acad. Nat. Sci. Philadelphia, 286. British Columbia.
stonei, Allen, 1899. Bull. Amer. Mus. Nat. Hist. XII, p. 5. Liard River, British Columbia.

19. MICROTUS ADMIRALTIAE, Heller

1909. Univ. Calif. Publ. Zool. V, p. 256.
Windfall Harbour, Admiralty Island, Alaska.

20. MICROTUS APHORODEMUS, Preble

1902. North Amer. Fauna, no. 22, p. 52.
About 50 miles south of Cape Eskimo, Thlewiaza River, Keewatin, Canada.

21. MICROTUS AZTECUS, Allen

1893. Bull. Amer. Mus. Nat. Hist. V, p. 73.
Aztec, San Juan County, New Mexico.

22. MICROTUS ENIXUS, Bangs

1896. Amer. Nat. XXX, p. 1051.
Hamilton Inlet, Labrador, Canada.

23. MICROTUS TERRAENOVAE, Bangs

1894. Proc. Biol. Soc. Washington, IX, p. 129.
Codroy, Newfoundland.

24. MICROTUS BREWERI, Baird

1857. Mamm. North Amer. p. 525.
Muskeget Island, Nantucket, Massachusetts.

25. MICROTUS NESOPHILUS, Bailey

1898. Science, N.S. 8, p. 782.
Great Gull Island, Long Island, Suffolk County, New York.
Synonym: *insularis*, Bailey, 1898, Proc. Biol. Soc. Washington, XII, p. 86.

montanus Group

(corresponding to the Old World *arvalis* Group?)

26. MICROTUS MONTANUS MONTANUS, Peale

1848. U.S. Explor. Exp. vol. 8, mamm. & ornith. p. 44.
Sacramento River, Mount Shasta, Siskiyou County, California.
Synonym: *longirostris*, Baird, 1857, Mamm. North Amer. p. 530. California.

27. MICROTUS MONTANUS YOSEMITE, Grinnell

1914. Proc. Biol. Soc. Washington, XXVII, p. 207.
Yosemite Valley, Mariposa County, California.

28. MICROTUS MONTANUS CARYI, Bailey

1917. Proc. Biol. Soc. Washington, XXX, p. 29.
Milford, Fremont County, Wyoming.

29. MICROTUS MONTANUS ARIZONENSIS, Bailey

1898. Proc. Biol. Soc. Washington, XII, p. 88.
Springerville, Apache County, Arizona.

30. MICROTUS MONTANUS RIVULARIS, Bailey

1898. Proc. Biol. Soc. Washington, XII, p. 87.
St. George, Washington County, Utah.

31. MICROTUS MONTANUS FUCOSUS, Hall

1935. Univ. Cal. Pub. Zool. 40, p. 421.
Hiko, Pahranagat Valley, Lincoln County, Nevada.

32. MICROTUS MONTANUS MICROPUS, Hall
1935. Univ. Cal. Pub. Zool. 40, p. 417.
Cleveland Ranch, Spring Valley, White Pine County, Nevada.

33. MICROTUS MONTANUS UNDOSUS, Hall
1935. Univ. Cal. Pub. Zool. 40, p. 420.
Lovelock, Pershing County, Nevada.

34. MICROTUS NANUS NANUS, Merriam
1891. North Amer. Fauna, no. 5, p. 63.
Pahsimeroi Mountains, Custer County, Idaho.

35. MICROTUS NANUS CANESCENS, Bailey
1898. Proc. Biol. Soc. Washington, XII, p. 87.
Conconully, Okanogan County, Washington.

36. MICROTUS CANICAUDUS, Miller
1897. Proc. Biol. Soc. Washington, XI, p. 67.
McCoy, Willamette Valley, Polk County, Oregon.

37. MICROTUS DUTCHERI, Bailey
1898. Proc. Biol. Soc. Washington, XII, p. 85.
Big Cottonwood Meadows, Tulare County, California.

38. MICROTUS NEVADENSIS, Bailey
1898. Proc. Biol. Soc. Washington, XII, p. 86.
Ash Meadows, Nye County, Nevada.

californicus Group

39. MICROTUS CALIFORNICUS CALIFORNICUS, Peale
1848. U.S. Explor. Exp. vol. 8, mamm. & ornith. p. 46.
San Francisco Bay, California.
Synonym: *edax*, Le Conte, 1853, Proc. Acad. Nat. Sci. Philadelphia, VI, p. 405. South of San Francisco Bay, California.
trowbridgei, Baird, Mamm. North America, 529, 1857.

40. MICROTUS CALIFORNICUS CONSTRICTUS, Bailey
1900. North Amer. Fauna, no. 17, p. 36.
Cape Mendocino, Humboldt County, California.

41. MICROTUS CALIFORNICUS EXIMIUS, Kellogg
1918. Univ. Calif. Publ Zool. XXI, p. 12.
Lierly's Ranch, Mount Sanhedrin, Mendocino County, California.

42. MICROTUS CALIFORNICUS AESTUARINUS, Kellogg
1918. Univ. Calif. Pub. Zool. XXI, p. 15.
Grizzly Island, Solano County, California.

43. MICROTUS CALIFORNICUS MARIPOSAE, Kellogg
1918. Univ. Calif. Pub. Zool. XXI, p. 19.
1¼ miles west of El Portal, Mariposa County, California.

44. MICROTUS CALIFORNICUS VALLICOLA, Bailey
1898. Proc. Biol. Soc. Washington, XII, p. 89.
Lone Pine, Inyo County, California.

45. MICROTUS CALIFORNICUS SCIRPENSIS, Bailey
1900. North Amer. Fauna, no. 17, p. 38.
Near Shoshone, Amargosa River, Inyo County, California.

46. MICROTUS CALIFORNICUS KERNENSIS, Kellogg

1918. Univ. Calif. Pub. Zool. XXI, p. 26.
Fay Creek, Kern County, California.

47. MICROTUS CALIFORNICUS MOHAVENSIS, Kellogg

1918. Univ. Calif. Pub. Zool. XXI, p. 29.
Victorville, San Bernardino County, California.

48. MICROTUS CALIFORNICUS SANCTIDIEGI, Kellogg

1922. Proc. Biol. Soc. Washington, XXXV, p. 78.
Escondido, San Diego County, California.
Synonym: *neglectus*, Kellogg, 1918, Univ. Cal. Pub. Zool. XXI, p. 31.

49. MICROTUS CALIFORNICUS HYPERYTHRUS, Elliot

1903. Field Columb. Mus. Pub. 74, Zool. ser. vol. 3, p. 161.
La Grulla, San Pedro Martir Mountains, Lower California, Mexico.

50. MICROTUS CALIFORNICUS PERPLEXABILIS, Grinnell

1926. Journ. Mamm. Baltimore, 7, p. 223.
La Grulla, Sierra San Pedro Martir, Lower California.

51. MICROTUS CALIFORNICUS AEQUIVOCATUS, Osgood

1928. Journ. Mamm. Baltimore, 9, p. 56.
San Quintin, Lower California.

52. MICROTUS CALIFORNICUS STEPHENSI, Bloeker

1932. Proc. Biol. Soc. Washington, XLV, p. 134.
Playa del Rey, Los Angeles, California.

53. MICROTUS CALIFORNICUS GRINNELLI, Huey

1932. Trans. S. Diego Nat. Hist. Soc. 7, p. 47.
Sangre de Cristo in Valle San Rafael on western base of Sierra Juarez, Lower California.

54. MICROTUS CALIFORNICUS PALUDICOLA, Hatfield

1935. Journ. Mamm. Baltimore, 16, p. 316.
Melrose Marsh, Almeda County, California.

operarius Group

(corresponding to the Old World *oeconomus* Group)

55. MICROTUS OPERARIUS OPERARIUS, Nelson

1893. Proc. Biol. Soc. Washington, VIII, p. 139.
St. Michael, Norton Sound, Alaska.

56. MICROTUS OPERARIUS ENDOECUS, Osgood

1909. North Amer. Fauna, no. 30, p. 23.
Mouth of Charlie Creek, Yukon River, Alaska, about 50 miles above Circle.

57. MICROTUS MACFARLANI, Merriam

1900. Proc. Washington Acad. Sci. II, p. 24.
Fort Anderson, Anderson River, Mackenzie, Canada.

58. MICROTUS YAKUTATENSIS, Merriam

1900. Proc. Washington Acad. Sci. II, p. 22.
Yakutat Bay, Alaska, north shore.

59. MICROTUS KADIACENSIS, Merriam

1897. Proc. Biol. Soc. Washington, XI, p. 222.
Kodiak Island, Alaska.

60. MICROTUS UNALASCENSIS UNALASCENSIS, Merriam

1897. Proc. Biol. Soc. Washington, XI, p. 222.
Unalaska, Alaska.

61. MICROTUS UNALASCENSIS POPOFENSIS, Merriam

1900. Proc. Washington Acad. Sci. II, p. 22.
Popof Island, Shumagin Islands, Alaska.

62. MICROTUS AMAKENSIS, Murie

1930. Journ. Mamm. Baltimore, 11, p. 74.
Amak Island, Behring Sea, Alaska.

63. MICROTUS SITKENSIS, Merriam

1897. Proc. Biol. Soc. Washington, XI, p. 221.
Sitka, Alaska.

64. MICROTUS INNUITUS INNUITUS, Merriam

1900. Proc. Washington Acad. Sci. II, p. 21.
St. Lawrence Island, Behring Sea, Alaska.
(According to Nelson, this is a member of subgenus *Stenocranius* see no. 67, *abbreviatus* and allies.)

65. MICROTUS INNUITUS PUNUKENSIS, Hall & Gilmore

1932. Univ. Calif. Pub. Zool. XXXVIII, p. 399.
Big Punuk Island, Behring Sea.

66. MICROTUS ELYMOCETES, Osgood

1906. Proc. Biol. Soc. Washington, XIX, p. 71.
Montague Island, Prince William Sound, Alaska.

abbreviatus Group

(Nelson, 1931, states that all members of this group are members of subgenus *Stenocranius*, as well as *innuitus*, and *muriei*, numbers 64 and 232 respectively of the present list.)

67. MICROTUS ABBREVIATUS ABBREVIATUS, Miller.

1899. Proc. Biol. Soc. Washington XIII, p. 13.
Hall Island, Behring Sea, Alaska.

68. MICROTUS ABBREVIATUS FISHERI, Merriam

1900. Proc. Washington Acad. Sci. II, p. 23.
St. Matthew Island, Behring Sea, Alaska.

69. MICROTUS MIURUS MIURUS, Osgood

1901. North Amer. Fauna, no. 21, p. 64.
Near Hope City, Bear Creek, Turnagain Arm, Cook Inlet, Alaska.

70. MICROTUS MIURUS OREAS, Osgood

1907. Proc. Biol. Soc. Washington, XX, p. 61.
Toklat River, Alaskan Range, Alaska.

townsendii Group

71. MICROTUS TOWNSENDII TOWNSENDII, Bachman

1839. Journ. Acad. Nat. Sci. Philadelphia, VIII, p. 60.
Columbia River, near mouth of Willamette, on or near Wappatoo (or Sauvie) Island.
Synonym: *occidentalis*, Peale, 1848, Mamm. U.S. Expl. Exp. p. 44.

72. MICROTUS TOWNSENDII CUMINGI, Hall
1936. Murrelet. Seattle, 17, p. 15.
Bowen Island, Howe Sound, British Columbia.

73. MICROTUS TETRAMERUS, Rhoads
1894. Proc. Acad. Nat. Sci. Philadelphia, p. 283.
Beacon Hill Park, Victoria, Vancouver Island, British Columbia.

longicaudus Group

74. MICROTUS LONGICAUDUS, Merriam
1888. Amer. Nat. XXII, p. 935.
Custer, Black Hills, Custer Co., S. Dakota.

75. MICROTUS MORDAX MORDAX, Merriam
1891. North Amer. Fauna, no. 5, p. 61.
Sawtooth Lake, Blaine County, Idaho.
Synonym: *vellerosus*, Allen, 1899, Bull. Amer. Mus. Nat. Hist. XII, p. 7. Upper Liard River, British Columbia.
cautus, Allen, 1899, Bull. Amer. Mus. Nat. Hist. XII, p. 7. Hell's Gate, Liard R., British Columbia.

76. MICROTUS MORDAX SIERRAE, Kellogg
1922. Univ. Calif. Pub. Zool. XXI, p. 288.
Toulumne Meadows, Yosemite National Park, California.

77. MICROTUS MORDAX BERNARDINUS, Merriam
1908. Proc. Biol. Soc. Washington, XXI, p. 145.
Dry Lake, San Bernardino Mountains, San Bernardino County, California.

78. MICROTUS MORDAX ABDITUS, Howell
1923. Journ. Mamm. Baltimore, 4, p. 36.
Walker's Ranch, 8 miles south of Tillamook, Tillamook County, Oregon.

79. MICROTUS MORDAX HALLI, New Name
New name for *angustus*, Hall. 1931, Univ. Cal. Pub. Zool. XXXVII, p. 13. Not of Thomas, 1908.
Godman Spring, Blue Mountains, Columbia County, Washington.

80. MICROTUS MORDAX LITTORALIS, Swarth
1933. Proc. Biol. Soc. Washington, XLVI, p. 209.
Shakan, Prince of Wales Island, Alaska.

81. MICROTUS MORDAX LATUS, Hall
1931. Univ. Calif. Pub. Zool. XXXVII, p. 12.
Wisconsin Creek, Toyabe Mountains, Nye County, Nevada.

82. MICROTUS MACRURUS, Merriam
1898. Proc. Acad. Nat. Sci. Philadelphia, p. 353.
Lake Cushman, Olympic Mountains, Mason County, Washington.

83. MICROTUS CORONARIUS, Swarth
1911. Univ. Calif. Pub. Zool. VII, p. 131.
Egg Harbour, Coronation Island, Alaska.

84. MICROTUS ANGUSTICEPS, Bailey
1898. Proc. Biol. Soc. Washington, XII, p. 86.
Crescent City, Del Norte County, California.

85. MICROTUS ALTICOLA ALTICOLA, Merriam

1890. North Amer. Fauna, no. 3, p. 67.
Little Spring, San Francisco Mountain, Coconino County, Arizona.

86. MICROTUS ALTICOLA LEUCOPHAEUS, Allen

1894. Bull. Amer. Mus. Nat. Hist. VI, p. 320.
Graham Mountains, Graham County, Arizona.

mexicanus Group

87. MICROTUS MEXICANUS MEXICANUS, Saussure

1861. Rev. et Mag. Zool. ser. 2, XIII, p. 3.
Mount Orizaba, Puebla, Mexico.

88. MICROTUS MEXICANUS NAVAHO, Benson

1934. Proc. Biol. Soc. Washington, XLVII, p. 49.
Soldier Spring, east slope of Navajo Mountain, San Juan County, Utah.

89. MICROTUS MEXICANUS PHAEUS, Merriam

1892. Proc. Biol. Soc. Washington, VII, p. 171.
Sierra Nevada de Colima, Jalisco, Mexico.

90. MICROTUS MEXICANUS GUADALUPENSIS, Bailey

1902. Proc. Biol. Soc. Washington, XV, p. 118.
Guadalupe Mountains, El Paso County, Texas.

91. MICROTUS FULVIVENTER, Merriam

1898. Proc. Biol. Soc. Washington, XII, p. 106.
Cerro San Felipe, Oaxaca, Mexico.

92. MICROTUS MOGOLLONENSIS, Mearns

1890. Bull. Amer. Mus. Nat. Hist. II, p. 283.
Baker's Butte, Mogollon Mountains, Yavapai County, Arizona.

xanthognathus Group

93. MICROTUS XANTHOGNATHUS, Leach

1814. Zool. Misc. vol 1, p. 60.
Hudson Bay. (Ranging west to Alaska.)

chrotorrhinus Group

94. MICROTUS CHROTORRHINUS CHROTORRHINUS, Miller

1894. Proc. Boston Soc. Nat. Hist. 26, p. 190.
Tuckerman's Ravine, Mount Washington, Coos County, New Hampshire.

95. MICROTUS CHROTORRHINUS RAVUS, Bangs

1898. Proc. Biol. Soc. Washington, XII, p. 188.
Black Bay, Strait of Belle Isle, Labrador, Canada.

96. MICROTUS CHROTORRHINUS CAROLINENSIS, Komarek

1932. Journ. Mamm. Baltimore, 13, p. 158.
Great Smoky Mountains, about 5 miles north of Smokemont, Swain County, North Carolina.

The remaining North American form is described as a member of the subgenus *Stenocranius* (below).

Palaearctic Forms

roberti Group

97. MICROTUS ROBERTI ROBERTI, Thomas

1906. Ann. Mag. Nat. Hist. 7, XVII, p. 418.
Sumela, south of Trebizond, Asia Minor.

98. MICROTUS ROBERTI OCCIDENTALIS, Turov

1928. Arb. Nord. Kaukas. Assoc. 44, p. 27.
Caucasus Mountains, S. Russia.

99. MICROTUS ROBERTI PERSONATUS, Ognev

1924. Rodentia of North Caucasus, p. 39.
N. Caucasus, Russia.

100. MICROTUS ROBERTI PSHAVUS, Shidlovsky

1919. Tiflis Bull. Terr. Exper. Stat. no. 5, p. 38.
Source of River Iora, Mgelat-Zihe (Kapari), 20 versts south-west from Mount Borbalo, Caucasus, Russia.

101. MICROTUS GUD GUD, Satunin

1909. Beitr. Kenntnis. Säugetier, p. 4.
Alm Tarpank auf d. Abusar-Dagh, Kr. Olty, Transcaspia.

102. MICROTUS GUD LASISTANIUS, Neuhäuser

1936. Zeitschr. für Säugetierk. 11, p. 160.
Varsambeg-Dat, Vilayet Riza, Àsia Minor.

nivalis Group

(It is possible that some races of *nivalis* from the Caucasus Mountains described by Russian authors may belong in the *roberti* group, or may be races of *gud*.)

103. MICROTUS SYRIACUS, Brants

1827. Het geslacht d. Muizen, p. 92.
Syria.

104. MICROTUS NIVALIS NIVALIS, Martins

1842. Rev. Zool. p. 331.
Faulhorn, Berne, Switzerland.
Synonym: ***petrophilus***, Wagner, 1853, Münch. Gel. Anz. 38, p. 307, Bavaria.
alpinus, Wagner, 1843, Schreber's Säugt. Suppl. III, p. 576. Uri, Switzerland.
nivicola, Schinz, 1845, Syn. Mamm. II, 236. Swiss Alps.

105. MICROTUS NIVALIS AQUITANIUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 99.
Near L'Hospitalet, Ariège, France.

106. MICROTUS NIVALIS HERMONIS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 103.
Mount Hermon, Palestine.

107. MICROTUS NIVALIS PONTIUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 102.
25 miles north of Baibort, Asiatic Turkey.

108. MICROTUS NIVALIS OSETICUS, Shidlovsky

1919. Tiflis Bull. Terr. Exper. Stat. 5, p. 36.
Near Village Edisi, Caucasus.

109. MICROTUS NIVALIS LUCIDUS, Shidlovsky

1919. Tiflis Bull. Terr. Exper. Stat. 5, p. 36.
Village Edisi, Caucasus.

110. MICROTUS NIVALIS IGHESICUS, Shidlovsky

1919. Tiflis Bull. Terr. Exper. Stat. 5, p. 36.
Eastern part of Central Caucasus Chain and Mountainous Daghestan.
Synonym: *nivalis ighesicus gotshobi*, Shidlovsky, same reference, p. 37.

111. MICROTUS NIVALIS TRIALETICUS, Shidlovsky

1919. Tiflis Bull. Terr. Exp. Stat. 5, p. 37.
Kisil-kilisa, Ashcala, Kuembet, Caucasus.

112. MICROTUS NIVALIS SATUNINI, Shidlovsky

1919. Tiflis Bull. Terr. Exp. Stat. 5, p. 37.
Forestland in vicinity of Village Mirzik, near Surnabad, Caucasus.

113. MICROTUS NIVALIS NEUJUKOVI, Formozov

1931. Folia Zool. Hydrob. Riga, 3, p. 81.
Bolschaja Loba, Maikop District, N.-W. Caucasus.

114. MICROTUS NIVALIS ABULENSIS Agacino

1936. Bol. Real Soc. Esp. Hist. Nat. 36, p. 151.
Solosancho, province of Avila, Spain.

115. MICROTUS NIVALIS OLYMPIUS, Neuhäuser

1936. Zeitschr. für Säugetierk. 11, p. 159.
Olymp, Valayet Brussa, Asia Minor.

116. MICROTUS NIVALIS MALYI, Bolkay

1925. Nov. Mus. Sarajevoensis, 1, p. 10.
Tisovica Valley, on Prenj Mountain, Hercegovina.

117. MICROTUS LEBRUNII LEBRUNII, Crespon

1844. Faune Meridionale, 1, p. 77.
Nîmes, Gard, France.

118. MICROTUS LEBRUNII LEUCURUS, Gerbe

1852. Rev. Mag. Zool, 2nd ser. IV, p. 260.
Barcelonnette, Basses-Alpes, France.

119. MICROTUS ULPIUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 100.
Hatszeg, Hunyad, Austria-Hungary.

socialis Group

120. MICROTUS SOCIALIS SOCIALIS, Pallas

1778. Nov. Sp. Quad. Glir. Ord. p. 218.
Ural River, W. Siberia.
Synonym: *gravesi*, Goodwin, 1934, Amer. Mus. Nov. 742, p. 2. Kazakstan.

121. MICROTUS SOCIALIS ASTRACHANENSIS, Desmarest

1822. Mammalogie, ii, p. 285.
Environs of Astrakan, S. Russia.

122. MICROTUS SOCIALIS SATUNINI, Ognev[1]
1924. Rodentia of North Caucasus, p. 37.
Tiflis, Caucasus, Russia.

123. MICROTUS SOCIALIS PARVUS, Satunin
1901. Mt. Kaukas Mus. 1, p. 117.
Village of Divny, N.-E. Caucasus.

124. MICROTUS SOCIALIS COLCHICUS, Argyropulo
1932. Journ. Mamm. Baltimore, 13, p. 268.
Transcaucasia.

125. MICROTUS SOCIALIS SCHIDLOVSKII, Argyropulo
1933. Zeitschr. für Säugetierk. 8, p. 182.
Transcaucasia.

126. MICROTUS SOCIALIS IRANI, Thomas
1921. Journ. Bombay Nat. Hist. Soc. XXVII, p. 41.
Shiraz, Persia.

127. MICROTUS SOCIALIS PARADOXUS, Ognev & Heptner
1928. Zool. Anz. 75, p. 263.
Kopet-Dag, S. Turkmenia, Transcaspia.

128. MICROTUS MYSTACINUS, Filippi
1864. Viagg. Persia, p. 255.
Persia.
Synonym: (?) *micruros*, S. G. Gmelin, 1774, Reise Russl. iii, p. 500.

guentheri Group

129. MICROTUS GUENTHERI GUENTHERI, Danford & Alston
1880. Proc. Zool. Soc. London, p. 62.
Marash, Asia Minor.

130. MICROTUS GUENTHERI SHEVKETI, Neuhäuser
1936. Zeitschr. für Säugetierk. 11, p. 160.
Tarsus, Vilayet Adana, Asia Minor.

131. MICROTUS GUENTHERI LYDIUS, Blackler
1916. Ann. Mag. Nat. Hist. 8, XVII, p. 426.
Smyrna, Asia Minor.

132. MICROTUS GUENTHERI HARTINGI, Barrett-Hamilton
1903. Ann. Mag. Nat. Hist. 7, XI, p. 307.
Larissa, Thessaly, Greece.

133. MICROTUS PHILISTINUS, Thomas
1917. Ann. Mag. Nat. Hist. 8, XIX, p. 450.
Ekron, south-east of Jaffa, Palestine.

134. MICROTUS MUSTERSI, Hinton
1926. Ann. Mag. Nat. Hist. 9, XVIII, p. 305.
Merg, Cyrenaica, N. Africa.

135. MICROTUS CABRERAE, Thomas
1906. Ann. Mag. Nat. Hist. 7, XVII, p. 576.
Rascafria, Sierra de Guadarrama, Province of Madrid, Spain.

[1] This appears to be preoccupied by No. 112 (*M. nivalis satunini*) of this list; I therefore rename it *binominatus*.

arvalis Group

136. MICROTUS ARVALIS ARVALIS, Pallas

1778. Nov. Sp. Quad. Glir. Ord. p. 78.
Germany.
Synonym: *fulvus*, Geoffroy, 1803, Cat. Mamm. Mus. Nat. Hist. Paris, p. 187. France.
vulgaris, Desmarest, 1822, Mammalogie, ii, 282. France.
albus, Bechstein, 1801, Gem. Nat. Deutschl. 1, 2nd ed., 998. Germany.
ater, de Sélys-Longchamps, 1845, Atti sesta Riun. Sci. Ital. Milano (1844), p. 321.
cunicularius, Ray, 1847, Rev. Zool. 312. France.
campestris, Blasius, 1853, Gelehrte Anz. München, XXXVII, 106. Germany.
gaillardi, Fatio, 1905, Arch. Sci. Phys. Nat. Genève, 4, xix, 197. Switzerland.
variabilis, Rörig & Börner, Arbeiten aus der kaiserlichen Biol. Anstalt fur Land- und Forstwirtschaft, V, Heft ii, p. 76, 1905. Germany.
contigua, Rörig & Börner, same reference, p. 76.
assimilis, Rörig & Börner, same reference, p. 77.
depressa, Rörig & Börner, same reference, p. 76.
simplex, Rörig & Börner, same reference.
principalis, Rörig & Börner, same reference.

137. MICROTUS ARVALIS MERIDIANUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 197.
Near Biarritz, Basses-Pyrenees, France.

138. MICROTUS ARVALIS DUPLICATUS, Rorig & Borner

1905. Arbeiten aus der kaiserlichen Biol. Anstalt für Land- und Forstwirtschaft, V, Heft ii, pl. v.
Rossiten, Ostpreussen, Germany.

139. MICROTUS ARVALIS LEVIS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 197.
Gageni, Prahova, Roumania, at foot of Carpathians, north-west of Bucharest.

140. MICROTUS ARVALIS GUDAURICUS, Ognev

1929. Ber. Microbiol. Staats. Ins. No. 9, p. 164.
Caucasus, Russia.

141. MICROTUS ARVALIS OBSCURUS, Eversmann

1841. Mem. Univ. Kazan, p. 156.
Siberia, Altai Mountains.

142. MICROTUS ARVALIS MACROCRANIUS, Ognev

1924. Rodentia of North Caucasus, p. 27.
N. Caucasus, Russia.

143. MICROTUS ARVALIS TRANSCAUCASICUS, Ognev

1924. Rodentia of North Caucasus, p. 30.
The Borchalinsk subdistrict, Tiflis govt. Caucasus.

144. MICROTUS ARVALIS ROSSIAEMERIDIONALIS, Ognev

1924. Rodentia of North Caucasus, p. 27.
Novyi Kurlak, Bobrov subdistrict of Voronej Govt., N. Caucasus.

145. MICROTUS ARVALIS TRANSURALENSIS, Serebrennikov

1929. Ann. Mus. Zool. Leningrad, 30, p. 257.
Transouralie méridionale, Russia.

146. MICROTUS ARVALIS BRAUNERI, Martino

1926. Ann. Mus. Nat. Hung. 23, p. 165.
Kraljevo, Serbia.

147. MICROTUS ARVALIS INCOGNITUS, Stein

1931. Mitt. Zool. Mus. Berlin, 17, p. 289.
Gimmel, Krs. Oels, Silesia, Czecho-Slovakia.

148. MICROTUS ARVALIS CIMBRICUS, Stein

1931. Mitt. Zool. Mus. Berlin, 17, p. 287.
Lauenberg, Schleswig-Holstein.

149. MICROTUS ARVALIS HAWELKAE, Bolkay

1925. Nov. Mus. Sarajevoensis, 1, p. 9.
Lebrsnik Mountains, near Gacko, Hercegovina.

150. MICROTUS ARVALIS RHODOPENSIS, Heinrich

1936. Bull. Inst. R.H.N. Sophia, 9, p. 48.
Village Tschepelare, Central Rhodopen, Bulgaria.

151. MICROTUS ARVALIS MUHLISI, Neuhäuser

1936. Zeitschr. für Säugetierk. 11, p. 194.
Bartin, Asia Minor.

152. MICROTUS ARVALIS RELICTUS, Neuhäuser

1936. Zeitschr. für Säugetierk. 11, p. 195.
Inevi, Asia Minor.

153. MICROTUS BREVIROSTRIS, Ognev

1924. Rodentia of the North Caucasus, p. 32.
N. Caucasus; surroundings of Vladikawkas.

154. MICROTUS TRANSCASPICUS TRANSCASPICUS, Satunin

1905. Mitt. Kaukas. Mus. II, pp. 57, 58.
Tschuli-Schlucht, Transcaspia.

155. MICROTUS TRANSCASPICUS ILAEUS, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 348.
Djarkent, Semiretschensk, on banks of River Ussek, E. Russian Turkestan.

156. MICROTUS SCHELKOVNIKOVI, Satunin

1907. Mitt. Kaukas. Mus. 3, p. 243.
Forest on path to village Dzi, Caucasus.

157. MICROTUS TSAIDAMENSIS, Satunin

1903. Ann. Mus. Zool. St. Petersb. VII (1902), p. 579.
Central Asia. See Tosso-noor; Tsaidam.
(Position doubtful.)

158. MICROTUS INCERTUS, de Sélys-Longchamps

1841. Atti della Sec. Riun. degli Sci. Ital. Torino, 1840, p. 225.
Near Summit of St. Gothard Pass, Uri, Switzerland.
Synonym: *fulva*, Fatio, 1869, Faune. Vert. Suisse, 1, 236, and
flava, Fatio, 1905, Arch. Sci. Phys. Nat. Genève, 4, xix, 195.

159. MICROTUS ASTURIANUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 198.
Pajáres, Leon, Spain.

160. MICROTUS MONGOLICUS, Radde

1862. Reise in den Süden von Ost-Sibirien, p. 194.
On der daurischen Hochsteppen, neighbourhood of Tarei-Nor, Siberia,

161. MICROTUS MALCOLMI, Thomas[1]

1911. Abstr. Proc. Zool. Soc. London, p. 5; Proc. Zool. Soc. London, p. 174.
South-east of Tau-chow, Kansu, China.

162. MICROTUS MONTEBELLOI MONTEBELLOI, Milne-Edwards

1871. Rech. Mamm. p. 285.
Japan.
Synonym: (?) *hanatedzumi*, Sasaki, 1904, Bull. Coll. Agric. Tokyo, vi, p. 52. Japan.

163. MICROTUS MONTEBELLOI BREVICORPUS, Tokuda

1933. Annot. Zool. Jap. 14, p. 236.
Sado Island, off Japan.

164. MICROTUS UCHIDAE, Kuroda

1924. Journ. Mamm. Baltimore, 5, p. 118.
Kurile Islands, off Japan.

165. MICROTUS KISHIDAI, Mori

1930. Journ. Chosen Nat. Hist. Soc. No. 10, p. 53.
Korea.

166. MICROTUS ORCADENSIS ORCADENSIS, Millais

1904. Zoologist, 4th ser. VIII, p. 244.
Pomona Island, S. Orkney Islands, Scotland.

167. MICROTUS ORCADENSIS RONALDSHAIENSIS, Hinton

1913. Ann. Mag. Nat. Hist. 8, XII, p. 457.
S. Ronaldshay Island, Orkneys.

168. MICROTUS ORCADENSIS SANDAYENSIS, Millais

1905. Mamm. Gt. Britain & Ireland, ii, p. 280.
Sanday Island, N. Orkney Islands.

169. MICROTUS ORCADENSIS WESTRAE, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 199.
Westray Island, N. Orkney Islands.

170. MICROTUS ORCADENSIS ROUSAIENSIS, Hinton

1913. Ann. Mag. Nat. Hist. 8, XII, p. 460.
Rousay Island, S. Orkneys.

171. MICROTUS SARNIUS, Miller

1909. Ann. Mag. Nat. Hist. 8, III, p. 420.
St. Martins, Guernsey, Channel Islands.

172. MICROTUS DENTATUS, Miller

1910. Ann. Mag. Nat. Hist. 8, VI, p. 459.
Molinicos, Sierra de Segura, Albacete, Spain.

[1] *Microtus malcolmi* has been wrongly allocated in this list. From the structure of its first lower molar, it appears to be a Chinese representative of the *oeconomus* group.

173. MICROTUS ANGULARIS, Miller
1908. Ann. Mag. Nat. Hist. 8, I, p. 198.
Transylvania, probably near Hatszeg, Hungary.

174. MICROTUS IGMANENSIS, Bolkay
1929. Nov. Mus. Sarajevoensis, 8, p. 1.
Near Sarajevo, Bosnia.

calamorum Group

175. MICROTUS UNGURENSIS, Kastschenko
1912. Ann. Mus. Zool. 17, p. 418.
Makoveevo, about 50 km. south-east from Chita, Transbaikalia.

176. MICROTUS CLARKEI, Hinton
1923. Ann. Mag. Nat. Hist. 9, XI, p. 158.
On divide between Kiuchiang and Salween Rivers, latitude 28° N., Yunnan, China.

177. MICROTUS CALAMORUM CALAMORUM, Thomas
1902. Ann. Mag. Nat. Hist. 7, X, p. 167.
North bank of Lower Yangtsekiang River, near Nanking, China.

178. MICROTUS CALAMORUM SUPERUS, Thomas
1911. Abstr. Proc. Zool. Soc. London, p. 27; Proc. Zool. Soc. London, p. 691.
30 miles south of Feng-hsiang-fu, S. Shen-Si, China.

179. MICROTUS MICHNOI MICHNOI, Kastschenko
1910. Ann. Mus. Zool. Ac. Sci. St. Petersb. 15, p. 288.
Transbaikalia.

180. MICROTUS MICHNOI PELLICEUS, Thomas
1911. Ann. Mag. Nat. Hist. 8, VII, p. 383.
Ussuri River, East Siberia.

181. MICROTUS FORTIS, Buchner
1889. Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 99.
Ordos, Central Asia.
(Position provisional.)

agrestis Group

182. MICROTUS AGRESTIS AGRESTIS, Linnaeus
1761. Faun. Suec. 11, pars. 2, no. 30, p. 11.
Upsala, Sweden.
Synonym: *gregarius*, Linnaeus, 1766, Syst. Nat. 1, 12th ed. p. 84. Germany and Sweden.
insularis, Nilsson, 1844, Ofvers. K. Vetensk. Akad. Forhandl. Stockholm, 1, p. 34. Ostgötha, Skärgard, Sweden.
nigricans, Kerr, 1792, Anim. Kingd. 239.

183. MICROTUS AGRESTIS EXSUL, Miller
1908. Ann. Mag. Nat. Hist. 8, I, p. 201.
N. Uist, Hebrides, Scotland.

184. MICROTUS AGRESTIS LEVERNEDII, Crespon

1844. Faune Méridionale, 1, p. 73.
Marshes between St. Gilles and Aigues-Mortes, Gard, France.
Synonym: *nigra*, Fatio, 1869, Faun. Vert. Suisse, 1, 241. Switzerland.
rufa, Fatio, 1900, Rev. Suisse Zool. VIII, 472. Switzerland.
angustifrons, Fatio, 1905, Arch. Sci. Phys. Nat. Genève, 4th ser. xix, 191. Switzerland.
latifrons, Fatio, same reference, p. 194. Switzerland.

185. MICROTUS AGRESTIS BAILLONI, de Sélys-Longchamps

1841. Atti della Sec. Riun. degli Sci. Italiani, Torino, 1840, p. 225.
Abbeville, Somme, France.
Synonym: *intermedia*, Bonaparte, 1845, Atti della Sesta Riun. degli Sci. Italiani, Milano, 1844, 350. nom. nud.

186. MICROTUS AGRESTIS HIRTUS, Bellamy

1839. Nat. Hist. S. Devon, p. 373.
Yealmpton, Devonshire, England.
Synonym: *brittanicus*, de Sélys-Longchamps, 1847, Rev. Zool. 307.

187. MICROTUS AGRESTIS NEGLECTUS, Jenyns

1841. Ann. Mag. Nat. Hist. 1, VII, p. 270.
Moors near Megarnie Castle, Perthshire, Scotland.

188. MICROTUS AGRESTIS ROZIANUS, Bocage

1865. Mem. Ac. Real Sci. de Lisboa, N.S. III, pt. 2, p. 7.
Geria, near Coimbra, Portugal.

189. MICROTUS AGRESTIS MACGILLIVRAII, Barrett-Hamilton & Hinton

1913. Proc. Zool. Soc. London, p. 831.
Islay, Hebrides.

190. MICROTUS AGRESTIS MIAL, Barrett-Hamilton & Hinton

1913. Ann. Mag. Nat. Hist. 8, XII, p. 364.
Eigg, Hebrides.

191. MICROTUS AGRESTIS LUCH, Barrett-Hamilton & Hinton

1913. Ann. Mag. Nat. Hist. 8, XII, p. 366.
Muck, Hebrides.

192. MICROTUS AGRESTIS FIONA, Montagu

1922. Proc. Zool. Soc. London, p. 940.
Gigha, Inner Hebrides.

193. MICROTUS AGRESTIS PUNCTUS, Montagu

1923. Proc. Zool. Soc. London, p. 868.
Bled, Slovenia, Yugoslavia.

194. MICROTUS AGRESTIS CALYPSUS, Montagu

1923. Proc. Zool. Soc. London, p. 869.
Nova Varos, Servia, Yugoslavia.

195. MICROTUS AGRESTIS ORIOECUS, Cabrera

1924. Publ. Cien. Nat. Barcelona, 7, No. 3, p. 8.
Molins, Montseny, Prov. Gerona, Catalonia, Spain.

196. MICROTUS AGRESTIS PANNONICUS, Ehik

1924. Ann. Mus. Nat. Hung. 21, p. 76.
Ormand, near Komarvaros, Co. Zala, Hungary.

197. MICROTUS AGRESTIS TRIDENTINUS, Dal Piaz
1924. Studi Trent, 5, No. 4, p. 10.
Brenner, N. Italy.

198. MICROTUS AGRESTIS ESTIAE, Reinwaldt
1927. Act. Comm. Univ. Tartu, 12, p. 13.
West Isles, Estonia.

199. MICROTUS AGRESTIS MONGOL, Thomas
1911. Ann. Mag. Nat. Hist. 8, VIII, p. 759.
Kemtchik Valley, Tannu-ola Mountains, N.-W. Mongolia.

200. MICROTUS ARCTURUS, Thomas
1912. Ann. Mag. Nat. Hist. 8, IX, p. 398.
Dzungaria, Central Asia.

oeconomus Group

201. MICROTUS OECONOMUS OECONOMUS, Pallas
1778. Nov. Sp. Quad. Glir. Ord. p. 225.
Siberia; definite locality uncertain.

202. MICROTUS OECONOMUS OURALENSIS, Poliakoff & Lataste
1884. Ann. Mus. Civ. Stor. Nat. Genova, p. 277.
Ural, Russia.

203. MICROTUS OECONOMUS DAURICUS, Kastschenko
1910. Ann. Mus. Zool. Acad. Sci. St. Petersb. 15, p. 293.
Transbaikalia.

204. MICROTUS OECONOMUS SUNTARICUS, Dukelski
1928. Zool. Anz. 78, p. 106.
Yakutsk, Siberia.

205. MICROTUS OECONOMUS SHANTARICUS, Ognev
1929. Zool. Anz. 83, p. 85.
Great Shantar Island, east coast Siberia.

206. MICROTUS OECONOMUS KORENI, G. M. Allen
1914. Proc. New Eng. Zool. Club, 5, p. 64.
Nijni Kolymsk, near mouth of Kolyma River, N.-E. Siberia.

207. MICROTUS OECONOMUS KAMTSCHATICUS, Pallas
1778. Nov. Sp. Quad. Glir. Ord. p. 233.
Kamtchatka, E. Siberia.

208. MICROTUS OECONOMUS TSHUKTSCHORUM, Miller
1899. Proc. Biol. Soc. Washington, XIII, p. 11.
Plover Bay, E. Siberia.

209. MICROTUS OECONOMUS KJUSJERENSIS, Jolyushev
1935. Animand. Syst. Mus. Zool. Inst. Biol. Univ. Tomsk, 1, p. 1.
Village Kusur, 71° N., right bank of River Lena, Siberia.

210. MICROTUS OECONOMUS RATTICEPS, Keyserling & Blasius
1841. Bull. Acad. Sci. Nat. St. Petersb. iv, livr. 3, p. 333.
Welikii-Ustjug, Dwina River, North-central Russia.
Synonym: *medius*, Nilsson, 1844, Ofvers. Kongl. Vetensk. Akad. Forh. Stockholm, 1, p. 34. Lapland, and mountains about the Gudbrandsdal, Norway.

(*Microtus oeconomus ratticeps*) *stimmingi*, Nehring, 1899, Sitz. Ber. Ges. Nat. Fr. Berlin, p. 69. Near Brandenburg, Germany.
arenicola, de Sélys-Longchamps, 1841, Bull. Acad. Roy. Sci. Arts. Bruxelles, VIII, 2, 236. Lisse, near Leiden, Holland.

211. MICROTUS OECONOMUS WETTSTEINI, Ehik

1929. Ann. Mus. Nat. Hung. 25, p. 197.
Trixen, Karinthia, Hungary.

212. MICROTUS OECONOMUS MEHELYI, Ehik

1929. Ann. Mus. Nat. Hung. 25, p. 197.
Rajka, Hungary.

middendorffi Group

213. MICROTUS MIDDENDORFFI, Poliakoff & Lataste

1884. Ann. Mus. Civ. Stor. Nat. Genova, p. 289.
Taimour, N. Siberia.
Synonym: *obscurus*, Middendorff, 1853, Reise Sibir. ii, p. 109, preoccupied.

214. MICROTUS HYPOBOREUS, Vinogradov. (Position provisional)

1934. Trav. L'Inst. Zool. Acad. Sci. 1933, p. 1.
Verhoiansk Mountains, E. Siberia.

mandarinus Group

215. MICROTUS MANDARINUS MANDARINUS, Milne-Edwards

1871. Rech. Mamm. p. 129.
Mongolia.

216. MICROTUS MANDARINUS FAECEUS, G. M. Allen

1924. Amer. Mus. Nov. no. 133, p. 8.
100 miles north-east of Pekin, Chihli, China.

217. MICROTUS JOHANNES, Thomas

1910. Abstr. Proc. Zool. Soc. London, p. 26; Proc. Zool. Soc. London, p. 637.
Ko-lan-chow, Shan-si, China.

218. MICROTUS PULLUS, Miller

1911. Proc. Biol. Soc. Washington, XXIV, p. 53.
Chiao Cheng Shan, 90 miles west of Tai Yuan Fu, Shan-si, China.

millicens Group

219. MICROTUS MILLICENS, Thomas

1911. Abstr. Proc. Zool. Soc. London, p. 49; Proc. Zool. Soc. London, p. 138.
Wei-choe, Si-ho River, W. Szechuan, China.

Subgenus *Stenocranius*, Kastschenko

(According to Nelson, 1931, this subgenus should also include the North American *abbreviatus* group, formerly listed as members of *Microtus* s.s. by Miller, 1923, etc.)

220. MICROTUS GREGALIS GREGALIS, Pallas

1779. Nov. Sp. Quad. Glir. Ord. p. 238.
E. Siberia.
Synonym: (?)*poljakowi*, Kastschenko, 1901, Ann. Mus. St. Petersb. VI, p. 31.

221. MICROTUS GREGALIS SLOWZOWI, Poliakoff

1881. Bull. Acad. Sci. St. Petersb. 39, p. 79.
Omsk, Siberia.

222. MICROTUS GREGALIS NORDENSKIOLDI, Poliakoff & Lataste

1884. Ann. Mus. Civ. Stor. Nat. Genova, XX, p. 290.
Taimoursk Peninsula, North-central Siberia.

223. MICROTUS GREGALIS BUTURLINI, Ognev

1924. Biol. Mitt. Timiriazeff, 1, p. 107.
Ryusskoe Ust, Indigirka, Siberia.

224. MICROTUS GREGALIS RADDEI, Poliakoff & Lataste

1884. Ann. Mus. Civ. Stor. Nat. Genova, XX, p. 299.
Transbaikalia district.
Synonym: *angustus*, Thomas, 1908, Proc. Zool. Soc. London, p. 108. Mongolia.

225. MICROTUS GREGALIS EVERSMANNI, Poliakoff & Lataste

1884. Ann. Mus. Civ. Stor. Nat. Genova, XX, p. 285.
Altai, Siberia.
Synonym: *tianschanicus*, Büchner, 1889, Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 107.

226. MICROTUS GREGALIS CASTANEUS, Kashkarov

1923. Trans. Sci. Soc. Turkestan, 1, p. 196.
W. Tianshan.

227. MICROTUS GREGALIS RAVIDULUS, Miller

1899. Proc. Acad. Nat. Sci. Philadelphia, p. 284.
Okchi Valley, Aksai, E. Turkestan.

228. MICROTUS GREGALIS MONTOSUS, Argyropulo

1932. Journ. Mamm. Baltimore, 13, p. 268.
Sary-Tash, Alai Valley, Russian Turkestan.

229. MICROTUS GREGALIS UNGUICULATUS, Koljuschew

1936. Trav. Inst. Sci. Biol. Tomsk, 2, p. 298.
Mouth of River Lena, Siberia.

230. MICROTUS KOSSOGOLICUS, Ognev

1924. Bull. Soc. Nat. Moscou, p. 80.
N.-W. Mongolia.

231. MICROTUS MAJOR, Ognev

1924. Bull. Soc. Nat. Moscou, p. 83.
Yamal Peninsula, N.-W. Siberia.

232. MICROTUS MURIEI, Nelson

1931. Journ. Mamm. Baltimore, 12, p. 311.
Kutuk River (tributary of Alatna River), Endicott Mountains, Alaska.
(Perhaps a member of the American *abbreviatus* group.)

Species not allocated to Groups

233. MICROTUS LIMNOPHILUS LIMNOPHILUS, Büchner

1889. Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 110.
Zaidam, Central Asia.

234. MICROTUS LIMNOPHILUS FLAVIVENTRIS, Satunin

1903. Ann. Mus. St. Petersb. vii, p. 577.
Kloster Tschortentan, Kansu, Central Asia.

235. MICROTUS DINNIKI, Satunin (nom. nud.?)

1903. Mamm. Caucasus, p. 59.
Surroundings of Maikon, Caucasus.

236. MICROTUS SAXATILIS, Pallas

1779. Nov. Sp. Quad. Glir. Ord. p. 255.
Transbaikal Region, Siberia.

237. MICROTUS MAXIMOWICZI, Schrenck

1858. Säugeth. Amurland, p. 140.
Amurland, E. Siberia.

238. MICROTUS KIKUCHI, Kuroda

1920. Dobuts. Zool. Tokyo, 32, p. 36.
Mt. Morrison, Formosa.
(A member of the genus *Eothenomys* is, in 1937, described from Formosa, which seems out of the range of true *Microtus*. I have not been able to see the description of *kikuchi*.)

Vinogradov quotes a form *Microtus* (*Stenocranius*) *gregalis brevicaudus*, from Yakutsk and Transbaikalia; the reference to this has not been traced.

Genus 17. LASIOPODOMYS, Lataste

1887. Lasiopodomys, Lataste, Ann. Mus. Civ. Stor. Nat. Genova, ser. 2a, IV, p. 268.

Type Species.—*Arvicola brandti*, Radde.

Range.—Eastern Asia: Mongolia, Manchuria, and Transbaikalia.

Number of Forms.—About four.

Characters.—This genus is often regarded as a synonym of *Phaiomys*, to which the type shows considerable resemblance in external characters, but has been revived by Hinton for those forms in which the first lower molar agrees with that of *Microtus*, while the external characters are as just indicated. The tail is short, fully haired, and little longer than the hindfoot; the sole is heavily haired, with six pads, "the two posterior very small, placed low down, and completely hidden beneath the hair" (Hinton). The ear is small. The foreclaws are considerably though not excessively lengthened. The supraorbital ridges fuse in the adult. The palate is as in *Microtus*. M.3 is reduced, with two inner folds only. M.1 lower has a posterior loop, five alternating closed triangles, and a small anterior loop. M.3 lower appears rather reduced.

Forms seen: *brandti*.

The species *warringtoni*, not seen, is described as near *brandti*, and the species *dolichocephalus*, not seen, as near *warringtoni*.

This genus is closely connected with *Microtus* by the *M. mandarinus* group, which have a similar skull and M.3, and in which the ear appears even more reduced; though the sole is less or not particularly hairy. The claws in this group may be large, though thinner than the few specimens seen of *Lasiopodomys*.

List of Named Forms

1. LASIOPODOMYS BRANDTI BRANDTI, Radde
1861. Mél. Biol. Acad. St. Petersb. iii, p. 683.
Tarei-nor, Plateau of Mongolia.

2. LASIOPODOMYS BRANDTI AGA, Kastschenko
1912. Ann. Mus. Zool. Acad. Sci. St. Petersb. 17, p. 418.
Transbaikalia.

3. LASIOPODOMYS WARRINGTONI, Miller
1913. Smiths. Misc. Coll. LX, 28, p. 1.
Tabool, 100 miles north of Kalgan, E. Mongolia.

4. LASIOPODOMYS DOLICHOCEPHALUS, Mori
1930. Annot. Zool. Japan, 12, p. 420.
Cheng-chiatun, Central Manchuria.

Genus 18. PROEDROMYS, Thomas

1911. Proedromys, Thomas, Proc. Zool. Soc. London, p. 177.

Type Species.—*Proedromys bedfordi*, Thomas.

Range.—Known from Kansu, China.

Number of Forms.—One.

Characters.—Skull with prominent peg-like squamosal crests, and supraorbital ridges probably fused in adult. Palate and zygomatic plate as in *Microtus*. Upper incisors broad, clearly one-grooved. Lower incisors short, scarcely invading the condylar process. Cheekteeth rootless, M.1 and M.2 (upper series) normal; M.3 strongly reduced, with one inner re-entrant fold only, and two closed triangles. M.1 lower with posterior loop, four closed triangles only, and the anterior loop and anterointernal triangle confluent. Third lower molar reduced, with third outer angle obsolete.

External form without peculiarities; tail short; plantar pads 6; mammae 8.

Forms seen: *bedfordi*.

List of Named Forms

1. PROEDROMYS BEDFORDI, Thomas
1911. Proc. Zool. Soc. London, p. 177.
South-east of Min-chow, Kansu, China.

Genus 19. PHAIOMYS, Blyth

1863. Phaiomys, Blyth. Journ. Asiat. Soc. Bengal, 32, no. 1, p. 89.

Type Species.—*Phaiomys leucurus*, Blyth.

Range.—Mountains of Central Asia: Tibet, Chinese Turkestan, Northern India to Nepal.

Number of Forms.—Six. The genus as restricted by Hinton appears to contain only the forms listed below. It is sometimes regarded as a subgenus of *Microtus*, and, in a wider sense, containing *Neodon*, *Lasiopodomys*.

Characters.—Skull with moderate squamosal crests, and without heavy supraorbital ridges, which, however, fuse in the adult. Incisors usually rather pro-odont. Bullae large, well inflated. Palate as in *Microtus*. First lower molar with only three closed triangles, and all in front of these merged into the anterior loop, which has a deep inner fold, but the anteroexternal fold is reduced (the fourth and fifth triangles are present, but not closed from each other nor from the anterior loop). M.2 and M.3 lower normal. Upper cheekteeth: M.1 and M.2 normal; M.3 reduced, with anterior loop, two closed triangles, and rather reduced posterior loop, the folds two each side. This tooth is more reduced than in, for instance, *Microtus nivalis*.

Mammae 3—2=10 or 2—2=8. Tail short, well haired. Foreclaws and hindclaws considerably though not excessively enlarged. Sole densely haired; plantar pads 5 (constant?); more or less concealed; ear relatively short.

Forms seen: *everesti*, *leucurus*, *petulans*, *strauchi*, *waltoni*.

Whether there is more than one valid species in this genus is not clear.

List of Named Forms

1. PHAIOMYS LEUCURUS LEUCURUS, Blyth

1863. Journ. Asiat. Soc. Bengal, XXXII, p. 89.
Tingri, Tibet.
Synonym: *blythei*, Blanford, 1875, Journ. Asiat. Soc. Bengal, XLIV, p. 107.

2. PHAIOMYS EVERESTI, Thomas & Hinton

1922. Ann. Mag. Nat. Hist. 9, IX, p. 182.
E. Mount Everest.

3. PHAIOMYS FUSCUS, Büchner

1889. Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 125.
Tibet.

4. PHAIOMYS STRAUCHI, Büchner

1889. Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 121.
Tibet.

5. PHAIOMYS WALTONI WALTONI, Bonhote

1905. Abstr. Proc. Zool. Soc. London, no. 22, p. 14; Proc. Zool. Soc. London, p. 306.
Lhasa, Tibet.

6. PHAIOMYS WALTONI PETULANS, Wroughton

1911. Journ. Bombay Nat. Hist. Soc. XX, p. 931.
Teza, Upper Sutlej Valley, Himalayas.

Genus 20. NEODON, Hodgson

1849. Neodon, Hodgson, Ann. Mag. Nat. Hist. 2, III, p. 203.

Type Species.—*Neodon sikimensis*, Hodgson.

Range.—Russian Turkestan, Sikkim, Kansu, Szechuan, and Yunnan.

Number of Forms.—Six.

Characters.—Skull with temporal ridges fused in fully adult (weakest in *carruthersi*), and squamosal crests quite well developed. Bullae as a rule rather small, mastoids not inflated. Other cranial characters normal; palate as *Microtus*. Upper cheekteeth: M.1, M.2 normal; M.3 about as *Microtus* in the type; tending in some species to become reduced, and with only two clear inner folds in *oniscus* and *irene*. M.2, and M.3 lower normal; M.1 with only three closed triangles, as in *Pitymys*, *Phaiomys*, and *Pedomys*; in *sikimensis*, there are in front of these two triangles (the fourth and fifth) confluent; two more triangles (sixth and seventh) confluent, and more or less closed off from the anterior loop. The other species lack the sixth and seventh triangles of the type; this tooth appears in *oniscus* and *carruthersi* to approach that of *Phaiomys*.

Plantar pads 5 in *carruthersi*, 6 so far as known in other species. Fur usually soft; tail relatively short, or of medium length (sometimes approaching half head and body length). Ear not reduced. External form not specially modified, not fossorial. Mammae 2—2=8 (Hinton) (some specimens of *sikimensis* are labelled as with 6 mammae). I take the genus to include the species *juldaschi*, Severtzow (=*pamirensis*, Miller).

If *Neodon* and *Phaiomys* are considered congeneric, as they are by some authors, the name *Neodon* should be used, antedating *Phaiomys* by fourteen years.

Three species groups are recognizable among material examined:

sikimensis group, from Sikkim, with unusually complex lower first molar (and skull with rather more prominent median interorbital crest than usual); mammae 6 (?); plantar pads 6.

carruthersi group, from Hissar Mountains, Russian Turkestan; rather small soft-furred form, with the median interorbital crest weak, and plantar pads 5; M.1 lower more normal.

juldaschi group: the other species; plantar pads, as far as known, 6; M.1 lower normal; without special peculiarities. *N. oniscus* seems to be the most dentally simplified of these forms.

Forms seen: *carruthersi*, *forresti*, *irene*, *oniscus*, *pamirensis*, *sikimensis*.

List of Named Forms

carruthersi Group

1. NEODON CARRUTHERSI, Thomas

1909. Ann. Mag. Nat. Hist. 8, III, p. 263.
Hissar Mountains, 100 miles east of Samarkand, Turkestan.

sikimensis Group

2. NEODON SIKIMENSIS, Hodgson

1849. Ann. Mag. Nat. Hist. 2, III, p. 203.
Sikkim.
Synonym: *thricolis*, Hodgson, 1863, Cat. Mamm. B.M. 2nd ed. p. 10, nom. nud.

juldaschi Group

3. NEODON FORRESTI, Hinton

1923. Ann. Mag. Nat. Hist. 9, XI, p. 156.
On divide between Mekong and Yangtse Rivers, in Latitude 27° 30′ N. N.-W. Yunnan.

4. NEODON ONISCUS, Thomas

1911. Ann. Mag. Nat. Hist. 8, VIII, p. 723.
40 miles south-east of Tao-Chou, Kansu.

5. NEODON IRENE, Thomas

1911. Abstr. Proc. Zool. Soc. London, p. 5; Proc. Zool. Soc. London, p. 173.
Ta-tsien-lu, Szechuan, China.

6. NEODON JULDASCHI, Severtzow

1879. Sapiski Turkest. Ot. Obs. Lub. Estest. vol. I, p. 63.
Lake Kara-kul, in Pamir Mountains.
Synonym: *pamirensis*, Miller, 1899, Proc. Acad. Nat. Sci. Philadelphia, p. 287. Tagdumbash, Pamir, E. Turkestan.

Genus 21. PEDOMYS, Baird

1857. PEDOMYS, Baird, Mamm. North Amer. p. 517.

TYPE SPECIES.—*Arvicola austerus*, Le Conte = *Hypudaeus ochrogaster*, Wagner.

RANGE.—North America: Central United States from Louisiana northwards just over the Canadian border (Alberta) (Wisconsin, Missouri, Oklahoma, Nebraska, Kansas, South Dakota, North Dakota, Colorado, Montana).

NUMBER OF FORMS.—Four.

CHARACTERS.—Like *Neodon*, but braincase deeper, mastoids more inflated; M.3 more reduced, with two inner folds, and shortened posterior loop; M.1 lower with posterior loop, three closed triangles, the fourth and fifth triangles confluent, and more or less closed off from anterior loop; other teeth normal. Plantar pads 5. Mammae 1—2 = 6. Fur long, coarse; ears rather small; tail rather shorter than is usual in *Neodon*.

REMARKS.—Regarded as a subgenus of *Microtus* by American authors. Distinct from that genus on the character of the first lower molar, but in my opinion not generically separable from *Neodon*.
Forms seen: "*austerus*," *minor*, *ochrogaster*.

LIST OF NAMED FORMS

(Revised by Bailey, 1900, North Amer. Fauna, no. 17.)

1. PEDOMYS OCHROGASTER, Wagner

1843. Schreber. Säugeth. Suppl. III, p. 592.
"America." (Central part of Mississippi Valley.)
Synonym: *austerus*, Le Conte, 1853, Proc. Acad. Nat. Sci. Philadelphia, VI, p. 405. Racine, Wisconsin.
cinnamomeus, Baird, 1857, Mamm. North Amer. p. 517. Pembina, N. Dakota.

2. PEDOMYS LUDOVICIANUS, Bailey

1900. North Amer. Fauna, no. 17, p. 74.
Iowa, Calcasieu Parish, Louisiana.

3. PEDOMYS HAYDENII, Baird

1857. Mamm. North Amer. p. 543.
Fort Pierre, S. Dakota (Stanley County).

4. PEDOMYS MINOR, Merriam

1888. Amer. Natur. XXII, p. 600.
Bottineau, Turtle Mountains, N. Dakota (Bottineau County).

Genus 22. PITYMYS, McMurtrie

1831. PITYMYS, McMurtrie, Cuviers Anim. Kingd. (American ed.), 1, p. 434.
1877. MICRURUS, Forsyth Major, Atti della Soc. Toscana di Sci. Nat. III, p. 126. (*Arvicola nebrodensis*, Mina-Palumbo.) Not of Ehrenberg, 1831.
1831. AMMOMYS, Bonaparte, Saggio Distrib. Metod. Anim. Vert. p. 20. (*Psammomys pinetorum*, Le Conte.)
1919. ARBUSTICOLA, Shidlovsky, Tiflis Bull. Terr. Exper. Stat. no. 2, p. 21. (*Microtus rubelianus*, Shidlovsky = *Pitymys majori*, Thomas.)

TYPE SPECIES.—*Psammomys pinetorum*, Le Conte.

RANGE.—Continental Europe south of the Baltic, eastwards to Ukraine, Asia Minor and Caucasus; South-eastern U.S.A.; Mexico. In Europe, occurs in Belgium, France, Switzerland, Hungary, Roumania, Italy, Sicily, Portugal, Spain, Montenegro, Greece, Czechoslovakia, Serbia, the Ukraine, the Caucasus, and Transcaucasia. In America, forms named from Georgia, New York, Oklahoma, Florida, and Vera Cruz (Mexico).

NUMBER OF FORMS.—About fifty-two.

CHARACTERS.—Skull weak, with relatively small squamosal crests, and supraorbital ridges widely separated in the adult in the interorbital region. The braincase is usually flattened to a greater or lesser degree. Zygomatic plate and infraorbital foramen normal. Incisors may be pro-odont in some species, as *ibericus*, *provincialis*, *thomasi*. Bullae relatively large. Palate posteriorly as in *Microtus*; pterygoid fossae deep. Upper cheekteeth: in the *subterraneus* group, including *majori*, the upper molars are about as in *Microtus arvalis*; M.3 is longer than M.2. In the *savii* group, M.3 is more reduced, with usually two inner re-entrant folds; this tooth is not longer than M.2. In the *ibericus* group, M.3 is still more reduced, the anteroexternal triangle is abnormally reduced, and confluent with the opposite triangle as a rule. The American species, so far as seen, have M.3 moderately reduced, about as in *P. savii*. Lower molars: M.3 with three transverse loops (very rarely closed triangles may be present in this tooth); M.2 with posterior loop and four alternating triangles; M.1 with posterior loop, then three closed triangles, then the fourth and fifth triangles which are confluent, well developed, and substantially closed from the anterior loop, which may be simple, or may possess a fold each side. M.2 lower may have the two front triangles confluent.

Plantar pads 5. Externally, at any rate as compared with *Microtus*, modified for fossorial life to a greater or lesser degree. Fur soft, dense; ear often strongly reduced (of those seen, apparently least so in the Mexican *quasiater*); foreclaws slightly lengthened; sole not fully haired; tail relatively short; mammae 0—2—4 or 1—2—6. Hinton divides the genus into two subgenera *Pitymys* and *Micrurus* based evidently solely on mammary formula. I have elsewhere remarked that it is inadvisable to retain names solely on this character (see genus *Rattus*, Murinae), and treat *Micrurus* as a synonym.

Miller (Catalogue of Mammals of Western Europe, p. 752) divides the European species into three groups:

subterraneus group, with complex *Microtus*-like M.3, in which I include *majori* from Asia Minor and the Caucasus which differs from *subterraneus* in mammary formula and relatively longer tail;

savii group, with more reduced M.3;

ibericus group, with M.3 still more reduced, as indicated above. This group contains the species listed above with strongly pro-odont upper incisors, and some species, as *depressus*, *lusitanicus*, *mariae*, *pelandonius*, without this character.

The American forms are revised by Bailey, North American Fauna, no. 17, 1900, p. 62.

Forms seen: *auricularis*, *brauneri*, *brunneus*, *capucinus*, *centralis*, *colchicus*, *dacius*, *daghestanicus*, *depressus*, *duodecimcostatus*, *fatioi*, *fuscus*, *gerbii*, *ibericus*, *intermedius*, *lusitanicus*, *majori*, *mariae*, *multiplex*, *nebrodensis*, *pelandonius*, *pinetorum*, *planiceps*, *provincialis*, *pyrenaicus*, *quasiater*, *regulus*, *savii*, *selysii*, *subterraneus*, *thomasi*, *mustersi* (*Pitymys mustersi*, Martino, 1937, from Yugoslavia), *hercegovinensis* (*Pitymys multiplex hercegovinensis*, Martino, 1939).

List of Named Forms

Palaearctic Forms

subterraneus Group

1. PITYMYS SUBTERRANEUS SUBTERRANEUS, de Selys-Longchamps

1836. Essai Monogr. sur les Campagnols des env. de Liège, p. 10.
Waremme, Liège, Belgium.
Synonym: *rufescentefuscus*, Schinz, 1845, Syn. Mamm. II, 240. Uri, Switzerland.
rufofuscus, Schinz, same reference.
fusca, Fatio, 1900, Rev. Suisse. Zool. VIII, 472.

2. PITYMYS SUBTERRANEUS CAPUCINUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 202.
Near Salon de Capucin, Mont-Dore, Puy-de-Dôme, France.

3. PITYMYS SUBTERRANEUS WETTSTEINI, Ehik

1926. Ann. Mus. Budapest, 24, p. 63.
Hungary.

4. PITYMYS SUBTERRANEUS ATRATUS, Stein

1931. Mitt. Zool. Mus. Berlin, 17, p. 293.
Krs. Trebnitz, Silesia.

5. PITYMYS SUBTERRANEUS MATRENSIS, Ehik

1932. Ann. Mus. Nat. Hist. Hung. 27, p. 252.
Matra Mountains, Hungary.

6. PITYMYS SUBTERRANEUS UKRAINICUS, Vinogradov

1922. "Nahojdenie veujnoi Rossi roda Pitymys," Isvestia Severnoi Oblasti Strasta 3; 7–10, fig. 1A–D.
Gouv. Kharkov, Ukraine, S. Russia.

7. PITYMYS DACIUS DACIUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 202.
Gageni, Prahova, north-west of Bucharest, Roumania.

8. PITYMYS DACIUS HUNGARICUS, Ehik

1926. Ann. Mus. Budapest, 24, p. 64.
Budafok, near Budapest, Hungary.

9. PITYMYS DRUENTIUS, Miller

1911. Proc. Biol. Soc. Washington, XXIV, p. 39.
Terres-plaines, near Barcelonnette, Basses-Alpes, France.
Synonym: *selysii*, Gerbe, 1852, Rev. Mag. Zool. 2nd ser. IV, 159. Not of Bonaparte.

10. PITYMYS FATIOI FATIOI, Mottaz

1909. Bull. Soc. Zool. de Genève, I, 180.
Zermatt, Valais, Switzerland.

11. PITYMYS FATIOI ORIENTALIS, Dal Piaz

1924. Studi. Trent. 5, no. 4, p. 13.
Trentino, Italy.

12. PITYMYS MULTIPLEX MULTIPLEX, Fatio

1905. Arch. Sci. Phys. Nat. Genève, 4th ser. XIX, p. 193.
Lugano, Ticino, Switzerland.

13. PITYMYS MULTIPLEX BRAUNERI, Martino

1926. Ann. Mus. Budapest, 23, p. 166.
Serbia, Kraljevo.

14. PITYMYS MAJORI MAJORI, Thomas

1906. Ann. Mag. Hat. Hist. 7, XVII, p. 419.
Sumela, south of Trebizond, Asia Minor.
Synonym: *rubelianus*, Shidlovsky, 1919, Tiflis. Bull. Ter. Exp. Stat. 2, p. 21.

15. PITYMYS MAJORI FINGERI, Neuhäuser

1936. Zeitschr. für Säugetierk. 11, p. 159.
Karadere, Northern Bolu, Asia Minor.

16. PITYMYS MAJORI COLCHICUS, Shidlovsky

1919. Tiflis Bull. Terr. Exper. Stat. no. 2, p. 21.
N. Koutais, Caucasus, Russia.

17. PITYMYS MAJORI INTERMEDIUS, Shidlovsky

1919. Tiflis Bull. Terr. Exp. Stat. no. 2, p. 22.
Southern declivities of Central Caucasus.

18. PITYMYS MAJORI DAGHESTANICUS, Shidlovsky

1919. Tiflis. Bull. Terr. Exp. Stat. no. 2, p. 22.
Daghestan, Caucasus.

19. PITYMYS MAJORI CISCAUCASICUS, Ognev

1924. Rodents of North Caucasus, p. 34.
Caucasus (Surroundings of Vladikawkas.)

20. PITYMYS TRANSSYLVANICUS, Ehik

1924. Ann. Mus. Budapest, 21, p. 159.
Mountains Fogaras, near Kercz, around the Bulea Lake, Hungary.

21. PITYMYS KUPELWIESERI, Wettstein

1925. Anz. Akad. Wiss. Wien, 62, p. 31.
Biological Station in Lunz, Lower Austria.

22. PITYMYS LICHTENSTEINI, Wettstein

1927. Anz. Akad. Wien, 2.
Gipfel des Mali Rainac, Velebit, bei Krasno, Croatia.

23. PITYMYS INCERTOIDES, Wettstein

1927. Anz. Akad. Wien, p. 3.
Gschnitztal, N. Tyrol.

24. PITYMYS EHIKI, Wettstein

1927. Anz. Akad. Wien, p. 3.
Martinitz bei Klobouk, Mahren, Moravia, Czecho-Slovakia.

25. PITYMYS NYIRENSIS NYIRENSIS, Ehik

1930. Ann. Mus. Hist. Nat. Hung. 27, p. 255.
Mateszalka, Szatmar County, Hungary.

26. PITYMYS NYIRENSIS MARTINOI, Ehik

1935. Allat. Kozlem. 32, p. 60.
Babje-gore, distr. Pozega, Slavonia, Yugo-Slavia.

savii Group

27. PITYMYS SAVII, de Sélys-Longchamps

1838. Revue Zool. p. 248.
Neighbourhood of Pisa, Italy.
Synonym: *selysii*, Bonaparte, 1845, Atti della Sesta Riun. degli Sci. Ital. Milano, 1844, p. 350.

28. PITYMYS NEBRODENSIS, Mina-Palumbo

1868. Ann. Agric. Sicil. XII, p. 61.
Le Madonie, Sicily.

29. PITYMYS PYRENAICUS PYRENAICUS, de Sélys-Longchamps

1847. Revue Zool. p. 305.
Bagnères de Bigorre, Hautes-Pyrénées, France.

30. PITYMYS PYRENAICUS BRUNNEUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 203.
Forest of Bouconne, Gers, France.

31. PITYMYS PLANICEPS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 203.
Barèges, Hautes-Pyrénées, France.

32. PITYMYS GERBII, Gerbe

1879. Le Naturaliste, Paris, I, p. 51.
Dréneuf, Loire-Inférieure, France.

33. PITYMYS BYRONI, Bolkay.
1926. Glasnik Zem. Mus. Sarajevo, p. 171.
Kephissia (Attica), Greece.

ibericus Group

34. PITYMYS LUSITANICUS, Gerbe
1879. Rev. Mag. Zool. 3rd ser. VII, p. 44.
Portugal.

35. PITYMYS MARIAE, Forsyth Major
1905. Ann. Mag. Nat. Hist. 7, XV, p. 515.
Villalba, Lugo, Galicia, Spain.

36. PITYMYS PELANDONIUS, Miller
1908. Ann. Mag. Nat. Hist. 8, I, p. 204.
Silos, Province of Burgos, Spain.

37. PITYMYS DEPRESSUS, Miller
1908. Ann. Mag. Nat. Hist. 8, I, p. 204.
Rascafria, Sierra de Guadarrama, Madrid, Spain.

38. PITYMYS FLAVESCENS, Cabrera
1924. Publ. Cien. Nat. Barcelona, 7, 3, p. 13.
Lerida, Artesa de Segre, Catalonia, Spain.

39. PITYMYS IBERICUS IBERICUS, Gerbe
1854. Rev. Mag. Zool. 2nd Ser. 6, p. 400.
Province of Murcia, Spain.

40. PITYMYS IBERICUS CENTRALIS, Miller
1908. Ann. Mag. Nat. Hist. 8, I, p. 205.
Near Silos, Province of Burgos, Spain.

41. PITYMYS IBERICUS PASCUUS, Miller
1911. Proc. Biol. Soc. Washington, XXIV, p. 39.
Dehesa de Valencia, Prov. of Valencia, Spain.
Synonym: *fuscus*, Miller, 1908, Ann. Mag. Nat. Hist. 8, I, 206. Not of Fatio.

42. PITYMYS IBERICUS REGULUS, Miller
1908. Ann. Mag. Nat. Hist. 8, I, p. 206.
Alhambra Hill, Granada, Spain.

43. PITYMYS DUODECIMCOSTATUS, de Sélys-Longchamps
1839. Rev. Zool. p. 8.
Montpelier, Gard, S. France.

44. PITYMYS PROVINCIALIS, Miller
1909. Ann. Mag. Nat. Hist. 8, III, p. 420.
Saint Gilles, Gard, France.

45. PITYMYS THOMASI, Barrett-Hamilton
1903. Ann. Mag. Nat. Hist. 7, XI, p. 306.
Vranici, Montenegro.

46. PITYMYS ATTICUS, Miller
1910. Ann. Mag. Nat. Hist. 8, VI, p. 460.
Kephissia, near Athens, Greece.

Nearctic Forms

(Revised by Bailey, North Amer. Fauna, no. 17, p. 62, 1900.)

47. PITYMYS PINETORUM PINETORUM, Le Conte

1829. Ann. Lyc. Nat. Hist. N.Y. III, p. 133.
Pine forests of Georgia, probably on the Le Conte plantation, near Riceboro, Liberty County.

48. PITYMYS PINETORUM SCALOPSOIDES, Audubon & Bachman

1841. Proc. Acad. Nat. Sci. Philadelphia, 1, p. 97.
Long Island, New York.
Synonym: *apella*, Le Conte, Proc. Acad. Nat. Sci. Philadelphia, IV, 405, 1853.
kennicotti, Baird, Mamm. North Amer. 547, 1857.

49. PITYMYS PINETORUM AURICULARIS, Bailey

1898. Proc. Biol. Soc. Washington, XII, p. 90.
Washington, Adams County, Mississippi.

50. PITYMYS NEMORALIS, Bailey

1898. Proc. Biol. Soc. Washington, XII, p. 89.
Stilwell, Adair County, Oklahoma.

51. PITYMYS PARVULUS, Howell

1916. Proc. Biol. Soc. Washington, XXIX, p. 83.
Ocala, Marion County, Florida.

52. PITYMYS QUASIATER, Coues

1874. Proc. Acad. Nat. Sci. Philadelphia, p. 101.
Jalapa, Vera Cruz, Mexico.

Genus 23. BLANFORDIMYS, Argyropulo

1933. Blanfordimys, Argyropulo, Zeitschr. für Säugetierk. 8, p. 182. (Subgenus of *Microtus*.)

Type Species.—*Microtus bucharicus*, Vinogradov.

Range.—Afghanistan and Russian Pamir. (In U.S.S.R., from Sarevshan Mountains, 8 km. south from Pendjakent, and in Surhan–Daria district, 28 km. west from Denau) (Vinogradov).

Number of Forms.—Two.

Characters.—(I have not seen the type species, and two skulls only of *B. afghanus*; the type as described and figured by Vinogradov appears essentially similar to *B. afghanus*.)

Supraorbital ridges not traceable in the British Museum material, nor according to Vinogradov in the type species. Mastoids extremely inflated, and appearing at back of skull each side, surpassing the occiput posteriorly. Bullae very large indeed. Palate, zygomatic plate normal (*Microtus* type).

Upper cheekteeth: M.1, M.2 normal; M.3 with anterior loop, two closed triangles, and posterior loop with a small triangle or projection on its antero-external side, the re-entrant folds two each side. Lower cheekteeth: M.2 and M.3 normal. M.1 with posterior loop, three closed triangles in front of which the fourth and fifth triangles are confluent, as in *Pitymys*, and closed off from the anterior loop. External form evidently not much modified; tail relatively short.

Blanfordimys was proposed as a subgenus of *Microtus* (containing also according to Argyropulo *Phaiomys*, *Neodon* and other groups recognized as genera by Hinton). Hinton has not yet dealt with the species. There is no doubt, I think, that the form constitutes a very distinct genus, more distinct from *Microtus* in my opinion than *Phaiomys*, *Neodon* and others. It seems to resemble *Pitymys* more than other genera, but the enormous bullae distinguish it at once from that genus, and indeed from all other Microtinae examined. However, few specimens have been seen, and more material would be welcome.

Forms seen: *afghanus*.

List of Named Forms

1. BLANFORDIMYS AFGHANUS, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 349.
Afghanistan.

2. BLANFORDIMYS BUCHARICUS, Vinogradov

1928. Abh. Pamir. Exped. 8, p. 14.
Zeravshankette, 8 km. südlich von Pendzhakent, beim Kischlak Sivon, Russian Pamir.

Genus 24. ARVICOLA, Lacepède

1799. Arvicola, Lacepède, Tab. de Mamm. p. 10.

Type Species.—*Mus amphibius*, Linnaeus.

Range.—Palaearctic: Europe, except Ireland and the smaller islands, north to Arctic, south to Mediterranean; Russia and Siberia east to Amur River; also known from Syria and Persia. In Western Europe, from Scotland, England, Spain, France, Norway, Sweden, Finland, Switzerland, Italy, Yugoslavia, Belgium, Germany, Estonia, Roumania; in U.S.S.R., from Kola Peninsula and Pechora district south to Ukraine and Caucasus in European Russia; Transcaucasia; Siberia to the River Lena, Yenessei, Irkutsk; Semipalatinsk; Kazakstan; Semirechyia, and other localities quoted by Vinogradov.

Number of Forms.—About thirty-three are named.

Characters.—Skull in adult becoming massive and angular, with prominent peg-like squamosal crests, and powerful supraorbital ridges which fuse into a sharp median crest; interorbital constriction great. Upper incisors often tending to be pro-odont. Occipital region strong, and paroccipital process relatively large. Bullae relatively small for a member of this subfamily. Palatal foramina variable, but often much constricted and reduced. Posterior palate as in *Microtus*. Upper cheekteeth: M.1, M.2 normal; M.3 with anterior loop, two or three closed triangles and short posterior loop, the inner folds of the tooth reduced to two. Lower cheekteeth: M.1 with posterior loop, three closed triangles, and anterior loop with a shallow fold present each side. Other lower molars normal. There is occasional individual variation in these teeth;

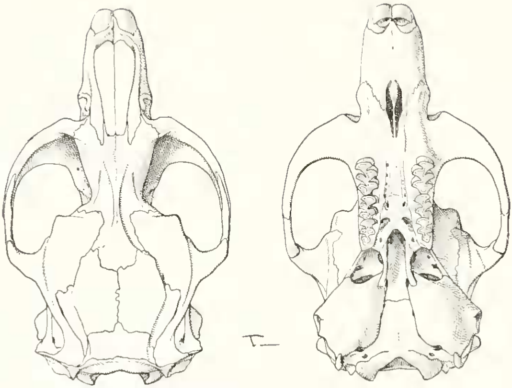

Fig. 48. Arvicola terrestris terrestris, Linnaeus.
B.M. No. 8.8.9.25, ♂; × 2.

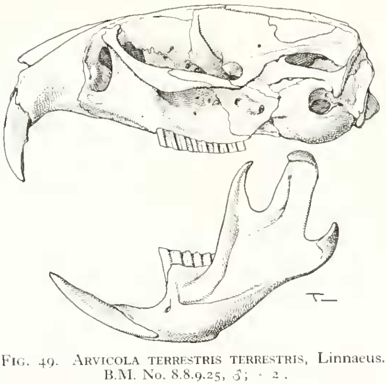

Fig. 49. Arvicola terrestris terrestris, Linnaeus.
B.M. No. 8.8.9.25, ♂; × 2.

I have seen one specimen with closed triangles in M.3 lower, and one with four closed triangles in M.1 lower. Cheekteeth evergrowing.

Mammae 2—2=8. Plantar pads usually 5; a rudimentary sixth one may be present; according to Hinton there is some individual variation in the characters of the hindfoot in this respect. Size large, largest of Palaearctic members of the subfamily; head and body usually over 150 mm., often over 200. Tail about half head and body length, or longer; well haired, the scales nearly concealed. Hindclaws and foreclaws prominent and enlarged; three centre digits of hindfoot longer than D.5, which is longer than the hallux. Sometimes slight aquatic

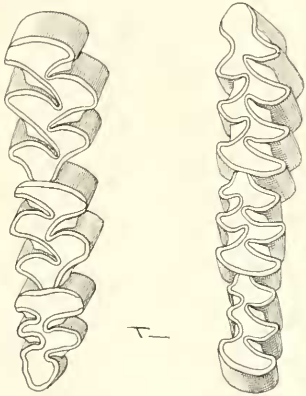

FIG. 50. ARVICOLA TERRESTRIS TERRESTRIS, Linnaeus.
Cheekteeth: B.M. No. 8.8.9.25; × 8.

modifications may be apparent, the foot with a small swimming-fringe developed. Fur thick; ear short. Sole of hindfoot mostly naked. Flank glands present in both sexes.

I do not think it is very likely that there is more than one valid species in this genus, though Hinton's arrangement is followed; on account of the fact that Vinogradov states that whereas the species *amphibius*, *terrestris*, and *scherman* can be maintained in Western Europe, in a large series of material from the U.S.S.R., the distinctions between them break down. Hinton (p. 410) suggests that intergradation may be found to take place between *terrestris* and *scherman* (the latter the most extreme type). *A. amphibius* is usually larger; *sapidus* seems to be not more than subspecifically separable from it. All forms in the U.S.S.R. are regarded as one species by Vinogradov.

Hinton remarks, "Apparently, that is so far as my observation goes, Voles of this genus are animals which never stop growing and never grow old . . . persistent growth of the cheekteeth appears to be accompanied by persistent growth of the skeleton; in the oldest individuals examined among the enormous amount of fossil and recent material at my disposal, not only are the molars in vigorous growth, but the epiphyses of the limb-bones are still unfused with their shafts."

Forms seen: *amphibius*, *armenius*, *brigantium*, *exitus*, *illyricus*, *italicus*, *meridionalis*, *monticola*, *musignani*, *persicus*, *reta*, *sapidus*, *scherman*, *scythicus*, *terrestris*, *tenebricus*, *korabensis* (*Arvicola terrestris korabensis*, Martino, 1937, from Yugoslavia).

List of Named Forms

1. ARVICOLA TERRESTRIS TERRESTRIS, Linnaeus

1758. Syst. Nat. 1, 10th ed. p. 61.
Upsala, Sweden.
Synonym: *paludosus*, Linnaeus, 1771, Mantissa Plantarum, pt. 2, p. 522.
ater, Billberg, 1827, Syn. Faun. Scand. p. 4.
littoralis, Billberg, same reference, p. 5.
aquaticus, Billberg, same reference.

2. ARVICOLA TERRESTRIS ITALICUS, Savi

1839. Nuovo Giorn. de Letterati, Pisa, 37, 102, p. 202.
Vicinity of Pisa, Italy.
Synonym: *pertinax*, Savi, 1839, Nuovo Giorn. de. Lett. Pisa, XXXVII, 102, p. 203.
minor, de Sélys-Longchamps, 1845, Atti della Sesta Riun. degli Sci. Ital. Milano, 1844, p. 322, nom. nud.

3. ARVICOLA TERRESTRIS MUSIGNANI, de Sélys-Longchamps

1839. Rev. Zool. p. 8.
Vicinity of Rome, Italy.
Synonym: *destructor*, Savi, 1839, Nuovo Giorn. Let. Pisa, XXXVII, 102, p. 204.
fuliginosus, de Sélys-Longchamps, 1845, Atti della Sesta Riun. degli Sci. Ital. Milano, 1844, p. 322, nom. nud.

4. ARVICOLA TERRESTRIS ILLYRICUS, Barrett-Hamilton

1899. Ann. Mag. Nat. Hist. 7, III, p. 225.
Bosnia, no exact locality.

5. ARVICOLA TERRESTRIS RUFESCENS, Satunin

1908. Mitt. Kauk. Mus. 4, p. 50.
Pokun Syrt, Podkumok, Karacai Territory, N. Caucasus.

6. ARVICOLA TERRESTRIS MERIDIONALIS, Ognev

1923. Biol. Mitt. Timiarazeff, 1, p. 109.
Tscherepinski Kanal, Ural District, Russia.

7. ARVICOLA TERRESTRIS PERSICUS, de Filippi

1865. Viaggio in Persia, 1865, p. 344.
Sultanieh, south of Elburz Mountains, Persia.
Synonym: *armenius*, Thomas, 1907, Ann. Mag. Nat. Hist. 7, XX, p. 201. Van, Asia Minor.

8. ARVICOLA TERRESTRIS SCYTHICUS, Thomas

1914. Ann. Mag. Nat. Hist. 8, XIII, p. 568.
Djarkent, Semiretchensk, Central Asia.

9. ARVICOLA TERRESTRIS OGNEVI, Turov

1926. Bul. Sci. Inst. Expl. Caucase, 1, p. 326.
Village of Kalaki, near the Mamissonschen Passess, Ossetinischen Militarstrasse, N. Ossetien, Caucasus.

10. ARVICOLA TERRESTRIS TATARICUS, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 158.
Gouv. Kasan, Russia.

11. ARVICOLA TERRESTRIS FERRUGINEUS, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 159.
Arctic coast of Russia.

12. ARVICOLA TERRESTRIS VOLGENSIS, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 162.
Volga Delta, Russia.

13. ARVICOLA TERRESTRIS CAUCASICUS, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 163.
Near Vladikawkas, Caucasus, Russia.

14. ARVICOLA TERRESTRIS TUROVI, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 165.
Kabardino-Balkarisches Gebiet, Staniza Kotljarevskaja, Tschernaja, Russia.

15. ARVICOLA TERRESTRIS VARIABILIS, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 169.
Gouv. Tomsk, Siberia.

16. ARVICOLA TERRESTRIS JENISSEJENSIS, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 170.
Minussinsk, Siberia.

17. ARVICOLA TERRESTRIS KUZNETZOVI, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 171.
Urdshar River, Semipalatinsk, Siberia.

18. ARVICOLA TERRESTRIS JACUTENSIS, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 172.
Yakutsk, Siberia.

19. ARVICOLA TERRESTRIS TAURICUS, Ognev

1923. Biol. Mitt. Timiarazeff, p. 109.
Umg. von Melitopol, Suden des Europ. Russlands.

20. ARVICOLA TERRESTRIS CUBANENSIS, Ognev

1933. Zeitschr. für Säugetierk. 8, p. 164.
Kuban River, Staniza (Kasaken Dorf) Grivenskaja, S. Russia.

21. ARVICOLA TERRESTRIS ABRUKENSIS, Reinwaldt

1927. Act. Com. Univ. Tartu, 12, p. 23.
West Isles, Estonia.

22. ARVICOLA TERRESTRIS HINTONI, Aharoni

1932. Zeitschr. für Säugetierk. 7, p. 209.
N. Syria.

23. ARVICOLA SCHERMAN SCHERMAN, Shaw

1801. Gen. Zool. 2, pt. 1, p. 75.
Strassburg, Germany.
Synonym: *albus*, Bechstein, Gem. Nat. Deutsch. 1801, 1, 2nd ed., p. 985.
canus, Bechstein, same reference.
argentoratensis, Desmarest, Mamm. II, p. 281, 1822.
buffonii, Fischer, Syn. Mamm. 293, 1829.

24. ARVICOLA SCHERMAN EXITUS, Miller

1910. Proc. Biol. Soc. Washington, XXIII, p. 21.
St. Gallen, Switzerland.
Synonym: *niger*, de Sélys-Longchamps, 1845, nom. nud.
castaneus, de Sélys-Longchamps, 1845, nom. nud. both Atti della Sesta Riun. degli Sci. Ital. Milano, 1844, p. 321.

25. ARVICOLA SCHERMAN MONTICOLA, de Sélys-Longchamps

1838. Rev. Zool. p. 249.
St. Bertrand de Comminge, Hautes-Pyrénées, France.

26. ARVICOLA AMPHIBIUS AMPHIBIUS, Linnaeus

1758. Syst. Nat. ed. 10, 1, p. 61.
England.
Synonym: *aquaticus*, Cuvier, 1817, Dict. Sci. Nat. 6, 306.
americana, Gray, 1842, Ann. Mag. X, 266.
nigricans, de Sélys-Longchamps, 1845, Atti della Sesta Riun. degli Sci. Ital. Milano, 1844, p. 322. nom. nud.

27. ARVICOLA AMPHIBIUS RETA, Miller

1910. Proc. Biol. Soc. Washington, XXIII, p. 19.
Aberdeen, Scotland.
Synonym: *ater*, Macgillivray, 1832, Mem. Wernerian Nat. Hist. Soc. 6, 429. Not of Billberg.

28. ARVICOLA AMPHIBIUS BRIGANTIUM, Thomas

1928. Ann. Mag. Nat. Hist. 10, I, p. 318.
Huddersfield, Northumbria, England.

29. ARVICOLA AMPHIBIUS KURUSCHI, Heptner & Formozov

1928. Zool. Anz. 77, p. 276.
Near Aul Kurusch, Samurski-Bezirk, Daghestan, E. Caucasus.

30. ARVICOLA AMPHIBIUS TANAITICA, Kalabuchow & Rajewskij

1930. Bull. N. Caucas. Pl. Prot. Sta. 5, p. 140.
Donez Region, S.-E. Russia.

31. ARVICOLA AMPHIBIUS DJUKOVI, Ognev & Formozov

1927. Ann. Mag. Nat. Hist. 9, XIX, p. 138.
Daghestan, Caucasus, Russia.

32. ARVICOLA SAPIDUS SAPIDUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 195.
Santo Domingo de Silos, Burgos, Spain.

33. ARVICOLA SAPIDUS TENEBRICUS, Miller

1908. Ann. Mag. Nat. Hist. 8, I, p. 196.
Biarritz, Basses-Pyrénées, France.
Synonym: *musiniani*, Lataste, Act. Soc. Linn. Bordeaux, XXXVIII, p. 37, not of de Sélys-Longchamps.

The "*Nesokia*" *argyropus* of Cabrera, 1901, Bol. Real Soc. Esp. Nat. Hist. 1, 118, Persia, belongs to this genus.

Genus 25. LAGURUS, Gloger

1841. Lagurus, Gloger, Hand- u. Hilfsbuch d. Naturg. vol. 1. p. 97.
1912. Lemmiscus, Thomas, Ann. Mag. Nat. Hist. 8, IX, p. 401. (*Arvicola curtata*, Cope.) Valid as a subgenus.

Type Species.—*Lagurus migratorius*, Gloger = *Mus lagurus*, Pallas.

Range.—South Russia, Russian Turkestan, Mongolia; Western North America. In the Palaearctic, from Ukraine, Northern Caucasus, Volga-Ural Steppe, Kazakstan, Minussinsk district, Tianshan, Dzungaria, Semirechyia, Ust Yurt and Karakum districts, Chinese Turkestan, and Mongolia. In America, from Nevada, Eastern California, Oregon, North Dakota, Montana, Alberta, Washington, Idaho, Utah.

Number of Forms.—Eleven.

Characters.—Skull angular, with prominent peg-like squamosal crests. The supraorbital ridges, though strong, do not fuse in the interorbital region. Bullae very large, the mastoids conspicuously inflated, tending to show in superior aspect of skull; the bullae and mastoids are more inflated than other members of the group, except *Blanfordimys*. The bullae, as in that genus, are spongy within. Zygoma robust. Interparietal rather small. Palate posteriorly as in *Microtus*. Cheekteeth evergrowing, lacking cement in folds, which are very widely open. M.1 with the usual elements, but also with a sharp projection between the anterior and posterior inner salient angles. M.2 with the usual elements, and this peculiarity repeated. M.3 in *L. luteus* with a straight anterior loop, three more or less closed triangles, and a long narrow straight posterior loop. In the type species, M.3 has an anterior loop, three closed triangles, and a slight projecting angle on the outer side in front of the posterior loop. M.1 lower with posterior loop, five closed triangles, and an anterior loop with a slight fold each side of it. M.2 normal. M.3 with posterior loop, and four closed triangles; this tooth therefore more or less like M.2. In the *luteus* group, the anterior loop of M.1 appears simple.

External form highly specialized. Tail about length of hindfoot only, fully haired. General appearance heavy, thickset and Lemming-like; ear extremely short, more or less covered by fur; sole of hindfoot densely haired, the pads (5 in number) concealed. Claws becoming prominent in *luteus* group. A black middorsal stripe present in *lagurus* group. Mammae 2—2 = 8.

I have seen comparatively few skulls of this genus. The American forms, which are not represented in the British Museum, are separated as a subgenus

Lemmiscus, on account of the "less Lemming-like external form; longer tail; M.3 lower with only three closed triangles." This group was diagnosed by Bailey (who revised it, 1900, North Amer. Fauna, no. 17, p. 67) as follows: "Plantar tubercles five. Mammae 2—2 = 8. Lateral glands on flanks. Tail little longer than hindfoot. . . . Bullae very large, mastoids reaching plane of exoccipital condyles. Molars slender, with wide re-entrant angles; M.3 with two closed triangles, and narrow posterior loop; M.1 (lower) with five closed triangles, four inner and four outer salient angles; M.3 (lower) with two terminal transverse loops and a pair of median triangles."

Apart from the American forms, which differ as indicated in the longer tail and the number of closed triangles in M.3 lower, there are two very distinct specific groups in the Palaearctic:

lagurus group: general coloration darker; a middorsal stripe; size smaller; M.3 with less reduced posterior loop; Ukraine, North Caucasus, North Kazakstan, South-east Russia, and eastwards to Tianshan and Minussinsk.

luteus group: general coloration paler; no middorsal stripe; size larger; M.3 with more reduced posterior loop; Mongolia, Chinese Turkestan, Dzungaria, Kazakstan, Karakum, to valley of River Ural. This group includes the species *przewalski*.

The genus appears very sharply separated from *Microtus* and its numerous allies.

Forms seen: *abacanicus*, *agressus*, *altorum*, *lagurus*, *luteus*, *przewalski*.

List of Named Forms

Subgenus *Lagurus*, Gloger

lagurus Group

1. LAGURUS LAGURUS LAGURUS, Pallas

1773. Reise, ii, p. 704.
Ural River, W. Siberia.
Synonym: *migratorius*, Gloger, 1841. Gemeinn. Nat. 1, p. 97. W. Siberia.

2. LAGURUS LAGURUS ALTORUM, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 401.
Barlik Mountains, N.-W. Dzungaria, Central Asia.

3. LAGURUS LAGURUS AGRESSUS, Serebrennikov

1929. Ann. Mus. Zool. Leningr. 30, p. 267.
Samara Gouv. Russia.

4. LAGURUS LAGURUS ABACANICUS, Serebrennikov

1929. Ann. Mus. Zool. Leningr. 30, p. 267.
Minussinsk district, Siberia.

luteus Group

5. LAGURUS LUTEUS, Eversmann

1840. Bull. Nat. Moscow, p. 25.
N.-W. Ufer des Aralsees, Turkestan.

6. LAGURUS PRZEWALSKII, Büchner

1889. Wiss. Res. Przewalski Central-Asien Reisen: Zool. Th. 1, Säugeth. p. 127.
Zaidam, Central Asia.

Subgenus *Lemmiscus*, Thomas

7. LAGURUS CURTATUS CURTATUS, Cope

1868. Proc. Acad. Nat. Sci. Philadelphia, p. 2.
Pigeon Spring, Mount Magruder, Nevada.

8. LAGURUS CURTATUS ARTEMISIAE, Anthony

1913. Bull. Amer. Mus. Nat. Hist. XXXII, p. 14.
Ironside, Malheur County, Oregon.

9. LAGURUS INTERMEDIUS, Taylor

1911. Univ. Calif. Publ. Zool. VII, p. 253.
Big Creek, Pine Forest Mountains, Humboldt County, Nevada.

10. LAGURUS PALLIDUS, Merriam

1888. Amer. Nat. XXII, p. 704.
Fort Buford, Williams County, N. Dakota.

11. LAGURUS PAUPERRIMUS, Cooper

1868. Amer. Nat. II, p. 535.
Plains of the Columbia, Snake River, S.-W. Washington.

(American forms revised by Bailey, North Amer. Fauna, no. 17, p. 67, 1900.)

Genus 26. NEOFIBER, True

1884. NEOFIBER, True, Science, IV, p. 34.

TYPE SPECIES.—*Neofiber alleni*, True.

RANGE.—Nearctic: Florida.

NUMBER OF FORMS.—Two.

CHARACTERS.—Skull with considerable interorbital constriction, and peglike squamosal crests. Zygomatic plate normal. Bullae medium in size. Temporal ridges widely separated on braincase, but in the one skull seen nearly fused in interorbital region. Palate about as *Ondatra* (below). Incisors broad. Cheekteeth evergrowing; M.1, M.2 normal; M.3 with anterior loop, two alternating closed triangles, and posterior loop, the inner folds two only. M.1 lower with posterior loop, five closed triangles, and rather complex anterior loop; M.2 normal; M.3 reduced, with only one outer fold and two salient angles.

Externally large; considerably modified for aquatic life, but less so than *Ondatra*; tail round (normal), with long hairs partly clothing it, but scales apparent; hindfoot considerably larger than forefoot; D.5 shorter than the three central digits, longer than the hallux; claws relatively well developed; pollex less reduced than is usual, foreclaws relatively large. Mammae 1—2=6. Plantar pads 5. Fur very soft. Swimming-fringes on feet and tail not highly developed.

Forms seen: *alleni*.

List of Named Forms

1. NEOFIBER ALLENI ALLENI, True

1884. Science, IV, p. 34.
Georgiana, Brevard County, Florida.

2. NEOFIBER ALLENI NIGRESCENS, Howell

1920. Journ. Mamm. Baltimore, 1, p. 79.
Ritta, Lake Okeechobee, Palm Beach County, Florida.

Genus 27. ONDATRA, Link

1795. Ondatra, Link, Beyträge zur Naturgesch. vol. 1, pt. 2, p. 76.
1800. Fiber, Cuvier, Tabl. Elem. Hist. Nat. Anim. p. 141. (*Castor zibethicus*, Linnaeus.)

Type Species.—*Castor zibethicus*, Linnaeus.

Range.—Nearctic, widely distributed in Canada and U.S.A. Canada from Alaska to Hudson Bay, and in Labrador; Newfoundland; most of United States except extreme south central portion, and not occurring in Florida; forms named from Virginia, Oregon, Nevada, Arizona, New Mexico, Kansas, Louisiana; a good range map published by Hollister, and in Anthony, Field Book North American Mammals, 1928. (The genus also now ranges owing to artificial human introduction, in parts of Europe).

Number of Forms.—Fifteen. The genus is revised by Hollister, North Amer. Fauna, no. 32, 1911.

Characters.—Skull angular, with extreme interorbital constriction; interorbital ridges fused to form a very sharp median crest, this continued backwards behind the level of the squamosal crests; temporal ridges close to each other on braincase. Lambdoid crest heavy in adult. Squamosal crests very prominent. Rostrum relatively heavy. Zygomatic plate strongly ridged above. Incisive foramina narrow but long; bullae relatively small, and lacking spongy tissue. Palate unspecialized posteriorly, the sloping median ridge found in *Microtus* is more or less suppressed, the spinous process short, the posterolateral pits small. Cheekteeth rooted in adult. M.1, M.2 upper normal; M.3 with anterior loop, two alternating triangles, and a moderately large rounded posterior loop. Lower molars: M.3 with two closed triangles between the terminating loops; M.2 normal; M.1 with posterior loop, five closed triangles, then two well-marked triangles (sometimes closed) nearly cut off from anterior loop by a deep inner and outer fold.

Size largest of subfamily; up to 320 mm. head and body or perhaps more. Externally highly modified for aquatic life; tail highly specialized, relatively long, more or less naked, but with well developed swimming-fringe below, and compressed laterally so that it is much higher than broad. D.2 of manus short, D.3 slightly longer than D.4; D.5 shortest; claws strong. Hindfoot much larger than forefoot; swimming-fringes conspicuous; sole naked; plantar pads 5 or 4; D.5 relatively long, but shorter than D.2; D.4 tending to be slightly longer than D.3; claws large; hallux quite well developed. Ear very short. Fur thick and soft (most valuable commercially). Mammae $1-2=6$. "Perineal glands, secreting a powerful musk, are well developed."

Forms seen: *obscura*, *osoyoosensis*, *zibethica*.

List of Named Forms

1. ONDATRA OBSCURA, Bangs

1894. Proc. Biol. Soc. Washington, IX, p. 133.
Codroy, Newfoundland.

2. ONDATRA ZIBETHICA ZIBETHICA, Linnaeus

1766. Syst. Nat. 12th ed. vol. 1, p. 79.
E. Canada.

3. ONDATRA ZIBETHICA MACRODON, Merriam

1897. Proc. Biol. Soc. Washington, II, p. 143.
Lake Drummond, Dismal Swamp, Norfolk County, Virginia.
Synonym: *niger*, Brass, Aus dem Reich der Pelze, p. 604, 1911.

4. ONDATRA ZIBETHICA AQUILONIA, Bangs

1899. Proc. New. Eng. Zool. Club, I, p. 11.
Rigolet, Hamilton Inlet, Labrador, Canada.

5. ONDATRA ZIBETHICA ALBA, Sabine

1823. Franklin's Narr. Journ. to Polar Sea, Appendix, p. 660.
Cumberland House, Saskatchewan, Canada.
Synonym: *hudsonius*, Preble, 1902, North Amer. Fauna, no. 22, p. 53.
Keewatin.

6. ONDATRA ZIBETHICA SPATULATA, Osgood

1900. North Amer. Fauna, no. 19, p. 36.
Lake Marsh, Yukon, Canada.

7. ONDATRA ZIBETHICA ZALOPHA, Hollister

1910. Proc. Biol. Soc. Washington, XXIII, p. 1.
Becharof Lake, Alaska Peninsula, Alaska.

8. ONDATRA ZIBETHICA OSOYOOSENSIS, Lord

1863. Proc. Zool. Soc. London, p. 97.
Lake Osoyoos, British Columbia, Canada.

9. ONDATRA ZIBETHICA OCCIPITALIS, Elliot

1903. Field Columb. Mus. Pub. 74, zool. ser. vol. 3, p. 162.
Florence, Lane County, Oregon.

10. ONDATRA ZIBETHICA MERGENS, Hollister

1910. Proc. Biol. Soc. Washington, XXIII, p. 1.
Fallon, Churchill County, Nevada.

11. ONDATRA ZIBETHICA PALLIDA, Mearns

1890. Bull. Amer. Mus. Nat. Hist. II, p. 280.
Fort Verde, Yavapai County, Arizona.

12. ONDATRA ZIBETHICA RIPENSIS, Bailey

1902. Proc. Biol. Soc. Washington, XV, p. 119.
Eddy, near Carlsbad, Eddy County, New Mexico.

13. ONDATRA ZIBETHICA CINNAMOMINA, Hollister

1910. Proc. Biol. Soc. Washington, XXIII, p. 125.
Wakeeney, Trego County, Kansas.

14. ONDATRA ZIBETHICA BERNARDI, Goldman

1932. Proc. Biol. Soc. Washington, XLV, p. 93.
4 miles south of Gadsden, Yuma County, Arizona.

15. ONDATRA RIVALICIA, Bangs

1895. Proc. Boston Soc. Nat. Hist. XXVI, p. 541.
Burbridge, Plaquemines Parish, Louisiana.

Genus 28. PROMETHEOMYS, Satunin

1901. Prometheomys, Satunin, Zool. Anz. XXIV, p. 572.

Type Species.—*Prometheomys schaposchnikowi*, Satunin.

Range.—Caucasus Mountains, Russia.

Number of Forms.—One.

Characters.—This genus and *Ellobius* differ from other Microtinae in their reduced third molars, and their extreme specialization towards underground life. The present genus is much the more primitive of the two in cranial characters. The molars in both are rooted. The present genus evidently relies on the claws for digging, whereas *Ellobius* burrows chiefly with the incisors.

Skull not highly abnormal. Supraorbital ridges fused in the interorbital region, and continuing backwards nearly to the lambdoid ridge. Interparietal small but not suppressed. Infraorbital foramen normal. Squamosal crests moderately developed. Zygoma relatively narrow. Upper incisors one-grooved. Mandible with high coronoid, and moderate angular portion. Incisive foramina not much reduced. Bullae large, but mastoids not inflated. Palate terminating posteriorly nearly as in *Clethrionomys*, but rather more primitive in structure than in that genus, "the inner borders of the posterolateral pits not directly connected with palatal shelf, each pit with a large foramen." Cheek-teeth rooted; upper cheekteeth more or less like those of *Ellobius* (below), but triangles tending to be more closed, so that M.1 can be normal. M.3 with two outer, one inner folds, the tooth reduced in size. M.1 lower with posterior loop, three closed triangles, and anterior loop with traces of a fold in it each side (which are sometimes well marked). M.2 with posterior loop, two closed triangles, and anterior loop. M.3 with two loops, this tooth very small. Each tooth with two roots; in M.1 a vestige of a third root, supporting the second inner angle—is sometimes present; in M.$\frac{3}{3}$ the roots may coalesce (Hinton).

Plantar pads 5. Mammae 2 – 2 = 8. Tail about a third of head and body length, fully haired. Ear small. D.5 of hindfoot rather strongly reduced; heel hairy. Hindclaws prominent. Foreclaws extremely enlarged; D.3 the main digit, D.4 a little longer than D.2; D.5 short. Pollex vestigial, but clawed.

Forms seen: *schaposchnikowi*.

List of Named Forms

1. PROMETHEOMYS SCHAPOSCHNIKOWI, Satunin

1901. Zool. Anz. XXIV, p. 574.
Alpine zone of the Central Caucasus, Russia.

Genus 29. ELLOBIUS, Fischer

1814. Ellobius, Fischer, Zoognosia, iii, p. 72.

Type Species.—*Mus talpinus*, Pallas.

Range.—From South Russia and Asia Minor eastwards through Russian Turkestan and Persia to Afghanistan, Baluchistan, Chinese Turkestan and Mongolia. In U.S.S.R., from Ukraine, Crimea, Transcaucasia, North Caucasus, Bashkiria, Ural, Kazakstan, Ashabad, Bokhara, Samarkand, Prealtai Steppe, Semirechyia, etc. (Vinogradov).

Number of Forms.—Seventeen.

Characters.—Skull highly modified for fossorial life; upper incisors extremely pro-odont, white in colour, and much lengthened. Supraorbital ridges tending to come together, though not well marked, and interparietal well developed in the type species. In this group there is no sagittal ridge formed. In *E. fuscocapillus* and *E. lutescens*, there is a sagittal crest, which in the former extends to the lambdoid; and no interparietal. Lambdoid ridge very promiment as a rule. Zygoma thick. Infraorbital foramen, large, abnormal, with no well marked outer wall, and no separate portion for nerve-transmission apparent. Squamosal crests weak. Bullae medium. Palate terminating posteriorly essentially as in *Microtus*. Palatal foramina small in the type, vestigial in the larger species (*fuscocapillus* group). Mandible with high recurved coronoid process; angular portion reduced; lower incisor root showing prominently beside condylar process. Cheekteeth rooted. Upper molars with apparently no closed triangles; M.1 with two inner, two outer folds; M.2 with two outer, one inner well-marked folds; M.3 very reduced, considerably smaller than M.2 (thus differing from other Microtinae, except *Prometheomys*), with one well-marked fold each side; a vestigial posterointernal fold, and a vestigial anteroexternal fold may be present. The pattern wears out with age. M.1, M.2 two-rooted; M.3 one-rooted, both upper and lower series (Hinton). Folds of cheekteeth without cement. Lower teeth: M.1 with four inner, three outer folds, the triangles confluent, not closed, the anteroexternal fold often very small. M.2 with two folds each side. M.3 with two well-developed folds each side, this tooth smaller than M.2.

Plantar pads 6. Mammae $2-2=8$. Externally highly specialized for underground life; tail shorter than hindfoot; fur soft; ear vestigial. Claws not much enlarged, but the hands and feet are broad. The three central digits of the hindfoot are longer than the two outer ones. The pollex is less reduced than is normal in a Rodent, and D.5 in the manus is short.

Two species groups, typified by *talpinus* and *fuscocapillus* are recognizable, characterized by the cranial peculiarities indicated above. The latter is typically larger than the type species. Vinogradov regards all named forms occurring in the U.S.S.R. as races of the type, except *fuscocapillus* and *lutescens*. Probably the Persian form *woosnami* is not more than a race of *lutescens*.

Forms seen: *albicatus, coenosus, fuscipes, fuscocapillus, kashtchenkoi, lutescens, talpinus, tancrei, transcaspiae, ursulus, woosnami*.

List of Named Forms

fuscocapillus Group

1. ELLOBIUS FUSCOCAPILLUS FUSCOCAPILLUS, Blyth

1841. Journ. Asiat. Soc. Bengal, X, p. 928.
Quetta, Baluchistan.

2. ELLOBIUS FUSCOCAPILLUS INTERMEDIUS, Scully

1887. Journ. Asiat. Soc. Bengal, LVI, p. 73.
Herat, Afghanistan.

3. ELLOBIUS LUTESCENS LUTESCENS, Thomas

1897. Ann. Mag. Nat. Hist. 6, XX, p. 308.
Van, Kurdistan, Asia Minor.

4. ELLOBIUS LUTESCENS WOOSNAMI, Thomas

1905. Abstr. Proc. Zool. Soc. London, no. 24, p. 23; Proc. Zool. Soc. London, p. 526.
Dumbeneh, Persia.

talpinus Group

5. ELLOBIUS TALPINUS TALPINUS, Pallas

1770. Nov. Comm. Acad. Petrop. XIV, 1, p. 568.
Kostytschi, west bank of River Volga, Russia.
Synonym: *murinus*, Pallas, 1811, Zoogr. Ross. As. 1, p. 160.
ater, Pallas, Nov. Sp. Quad. Glir. Ord. 179, 1778.

6. ELLOBIUS TALPINUS RUFESCENS, Eversmann

1850. Estest. Istor. Orenberg, Kraya, ii, p. 175.
"Steppes eastwards from River Ural" (Vinogradov).

7. ELLOBIUS TALPINUS TANCREI, Blasius

1884. Zool. Anz. VII, p. 197.
Altai Mountains, Siberia.

8. ELLOBIUS TALPINUS KASHTCHENKOI, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 404.
Tomsk, W. Siberia.

9. ELLOBIUS TALPINUS TRANSCASPIAE, Thomas

1912. Ann. Mag. Nat. Hist. 8, IX, p. 405.
Sultan-Bent, Transcaspia.

10. ELLOBIUS TALPINUS OGNEVI, Dukelskaja

1927. Bull. Univ. Asia. Centr. 15, p. 71.
Bokhara, Turkestan.

11. ELLOBIUS TALPINUS URSULUS, Thomas
1912. Ann. Mag. Nat. Hist. 8, IX, p. 403.
Dzungaria, Central Asia.

12. ELLOBIUS TALPINUS FUSCICEPS, Thomas
1909. Ann. Mag. Nat. Hist. 8, III, p. 265.
Samarkand, Turkestan.

13. ELLOBIUS TALPINUS ALBICATUS, Thomas
1912. Ann. Mag. Nat. Hist. 8, IX, p. 401.
S.-E. Hami Mountains, N.-E. Chinese Turkestan.

14. ELLOBIUS TALPINUS COENOSUS, Thomas
1912. Ann. Mag. Nat. Hist. 8, IX, p. 402.
Muzart Valley, Tian-Shan, China.

15. ELLOBIUS TALPINUS (?) LARVATUS, G. M. Allen
1924. Amer. Mus. Nov. no. 133, p. 11.
Artsa Bogdo, Sain Noin, Mongolia.

16. ELLOBIUS TALPINUS (?) ORIENTALIS, G. M. Allen
1924. Amer. Mus. Nov. no. 133, p. 12.
Iren Dabasu, E. Mongolia.

Not allocated to Group

17. ELLOBIUS FARSISTANI, Ugarov
1928. Acta. Univ. Tashkent, 8A, no. 4, p. 12.
Persia.

The subfamily Microtinae is known fossil from the Miocene. Full notes on many fossil forms are given by Hinton, Monograph of Voles and Lemmings.

Genera Unrepresented

There is one named genus, not represented in the British Museum:

NEOASCHIZOMYS, Tokuda

1935. Mem. Coll. Sci. Kyoto, 10B, p. 241.

Type.—*N. sikotanensis*, Tokuda, same reference, p. 242, from Sikotan Island, Kurile Islands, north of Japan.

It appears to be closely allied to, or probably a subgenus of *Clethrionomys*, with which it agrees in structure of palate, and rooted cheekteeth, but is more specialized according to its describer because "its body is furnished with remarkably thick and soft fur," "it has a massive and robust external body well adapted for fossorial life," "it has marked angularity of the skull, with well-developed facial muscles."

M.3 lower is said to be not much displaced by the shaft of the lower incisor (like normal *Clethrionomys*, according to Hinton's key).

MICROTINAE

SPECIAL WORKS OF REFERENCE

HINTON, Monograph of Voles and Lemmings, 1, 1926.

MILLER, North American Fauna, no. 12, 1896; genera and subgenera of Microtinae.

BAILEY, Proc. Biol. Soc. Washington, XI, p. 113, 1897. Revision of North American *Clethrionomys* under the name *Evotomys*.

BAILEY, North American Fauna, no. 17, 1900. Revision of North American *Microtus* (with *Pitymys*, *Pedomys*, *Lagurus*, *Neofiber*).

HOWELL, North American Fauna, no. 50, 1927. Revision of *Synaptomys*.

G. M. ALLEN, Bull. Mus. Comp. Zool. Harvard Coll. LXII, p. 509, 1919. Revision of *Dicrostonyx*.

HOWELL, North Amer. Fauna, no. 48, 1926. Revision of *Phenacomys*.

HOLLISTER, North Amer. Fauna, no. 32, 1911. Revision of *Ondatra*, under the name *Fiber*.

VINOGRADOV, Rodents of U.S.S.R., Tabl. Anal. Fauna l'URSS. Inst. Zool. Acad. Sci. 10, p. 11, 1933. Microtinae, species occurring in U.S.S.R.: *Myopus*, *Lemmus*, *Dicrostonyx*, *Ellobius*, *Prometheomys*, *Clethrionomys*, *Alticola* (with *Aschizomys*), *Lagurus*, *Arvicola*, *Microtus* (with *Pitymys*, *Neodon*, *Blanfordimys*, *etc.*).

MILLER, Catalogue Mammals Western Europe, 1912, p. 610. *Myopus*, *Lemmus*, *Clethrionomys*, *Microtus*, *Arvicola*, *Pitymys*.

ARGYROPULO, Subgenera of *Microtus* in Palaearctic region; 1933, Zeitschr. für Säugetierk. 8, p. 182.

THE END

(*Completed for publication June 30th, 1939*)

APPENDIX I

LIST OF NEW NAMES PUBLISHED IN THIS WORK

VOL. I

"*Tamiops*" (= *Callosciurus*) *lylei*, Thomas, 1920, replaced by *holti*, new name, p. 355.
Not *Callosciurus lylei*, Wroughton, 1908.

Citellus atricapilla, Orlov, 1927, replaced by *binominatus*, new name, p. 442.
Not *Citellus* (*Otospermophilus*) *atricapillus*, Bryant, 1889.

Citellus pallidus, Orlov & Feniuk, 1927, replaced by *orlovi*, new name, p. 442.
Not *Citellus pallidus*, Allen, 1877.

VOL. II

MICAËLAMYS, subgenus new, of *Rattus*, for *Mus granti*, Wroughton, from South Africa; pp. 149, 170.

"*Stenomys*" (= *Rattus*) *klossi*, Thomas, 1913, replaced by *haymani*, new name, p. 206.
Not *Rattus klossi*, Bonhote, 1906.

"*Stenomys*" (= *Rattus*) *claræ*, Rummler, replaced by *pococki*, new name, p. 206.
Not *Rattus claræ*, Miller, 1913.

"*Myomys*" (= *Rattus*) *saturatus*, Ingoldby, replaced by *ingoldbyi*, new name; p. 211.
Not *Rattus saturatus*, Lyon, 1911.

RATTUS TATEI, sp. nov. (*concolor* group), from Tamalanti, Mid Celebes, p. 215.

RATTUS FROSTI, sp. nov. (*xanthurus* group), from Tamalanti, Mid Celebes, p. 216.

RATTUS HELLWALDI DOLLMANI, subsp. nov. from Rantekaroa, Quarles Mountains, Mid. Celebes, p. 218.

Mus mystacinus, Mohr, replaced by *mohri*, new name, p. 246.
Not *Mus mystacinus*, Danford & Alston (an *Apodemus*).

ZOKOR, subgenus new, of *Myospalax*, for *Myospalax fontanieri*, Milne-Edwards, p. 541. To include *fontanieri* group, and *M. smithi*, Thos.

Microtus angustus, Hall, 1931, replaced by *halli*, new name, p. 603.
Not *Microtus angustus*, Thomas, 1908.

Microtus satunini, Ognev, 1924, replaced by *binominatus*, new name, p. 607.
Not *Microtus satunini*, Shidlovsky, 1919.

APPENDIX II

1. Correction to LIST OF NAMED FORMS in Genus SCIURUS (Vol. I, p. 343)

On ground of priority the specific name used for forms Nos. 162 and 163 should be *paraensis*, Goeldi (1904) and not *alphonsei*, Thomas (1906) as printed.

2. Correction of locality for *Sciurillus murinus* (Vol. 1, p. 64). For "Philippines" read Celebes.

APPENDIX III

FURTHER NOTES ON NAMED FORMS IN THE GENUS RATTUS

THE important work on *Rattus*, Chasen, Handlist Malay Mammals, Bull. Raffles Mus. Singapore, no. 15, 1940, arrived too late to be utilized in my list above. Some notes are given, below, on the first 430 names, coupled with a few further suggestions on some of the Indian forms.

No. 1. *Rattus baluensis.* Chasen says it is almost certainly a high level form of *Rattus rattus.*

12. *Rattus canus*, and races. This species also occurs in Borneo and Java.

15. *Rattus tanezumi* is I think a race of *Rattus rattus*, and the same applies probably to no. 16, *R. losea.*

20. *Rattus turkestanicus*, *vicerex*, and *rattoides* will doubtless all prove to be races of the earliest named *rattoides*; it is possible also that no. 145, *humiliatus*, and races, might represent this branch in China, and not *norvegicus* as I had previously supposed.

80. *Rattus rattus palembang* is a synonym of no. 93, *R. r. diardi*, according to Chasen.

82. *Rattus rattus brevicaudatus* is a synonym of *R. r. argentiventer*, no. 79, according to Chasen.

83. *Rattus rattus bali;* a synonym of *R. r. diardi*, no. 93, according to Chasen.

84. *Rattus rattus samati*, is a synonym of *R. r. diardi*, no. 93.

94. *Rattus rattus neglectus*, is also a synonym of *R. r. diardi.*

97. *Rattus montanus*, Phillips, Ceylon, is a very distinct species characterized by, for the genus, unusually complex and heavily cuspidate molars.

101. *Rattus* "*griseiventer griseiventer*," is a synonym of *Rattus rattus diardi*, no. 93, according to Chasen.

102. *Rattus* "*griseiventer*" *annandalei* is a valid species according to Chasen. He says *bullatus* (no. 118), synonym *villosus* (no. 201), is a race of it. Whether this is so or not, specimens seen of *villosus* represent a thoroughly distinct species, probably of *rattus* group and not *mulleri* group as here listed.

104. *Rattus remotus*, is a race of *annandalei*, no. 102, according to Chasen.

Nos. 105, *tingius*, 107, *roa*, 108, *pannosus*, 109, *pannellus*, 113, *lugens*, 114, *maerens*, 115, *simalurensis*, 116, *babi*, and 117, *lasiae*, are all races of *Rattus rattus.*

No. 118. *Rattus bullatus*, is a race of *annandalei*, no. 102, according to Chasen. See note above, on no. 102.

Nos. 119, *siantanicus*, 120, *tiomanicus*, 121, *tambelanicus*, 123, *tua*, and 124, *julianus*, are all races of *Rattus rattus.*

Nos. 125, *dammermani*, and 126, *pesticulus*, are both, I think, races of *Rattus rattus.*

No. 145. *Rattus humiliatus* and races; it is possible that these are the Chinese representatives of *rattoides*, and not *norvegicus*; see note above, no. 20. *R. rattoides* differs from *rattus*, among other things, by its considerably shorter palate.

165. *Rattus concolor clabatus*; is a synonym of *concolor*, according to Chasen.

169. *Rattus pullus;* a synonym of *R. c. concolor*, no. 162, according to Chasen.

170. *Rattus surdus*, is a race of *R. concolor*.

171. *Rattus schuitemakeri*, is a synonym of *R. concolor ephippium*, no. 163, according to Chasen.

172. *Rattus raveni* is I think a race of *R. concolor*. But I think this whole group, including *concolor*, will have to bear the name *Rattus exulans*, Peale, 1848, (no. 189), which antedates *concolor*. Doubtless the Philippines forms are races also.

193. *Rattus mulleri;* its synonym, *victor*, Miller, should be listed as a synonym of *validus*, no. 198, and not of *mulleri*.

195. *Rattus mulleri fœderis*, is a synonym of *R. mulleri validus*, no. 198.

198. *Rattus validus*, is a race of *mulleri*.

199. *Rattus validus terempa*, is a race of *mulleri*.

200. *Rattus jarak;* wrongly allocated here; it is a race of *R. rattus*.

201. *Rattus villosus;* wrongly allocated here; it is, according to Chasen, a synonym of *bullatus*, no. 118, which Chasen thinks is a race of *annandalei*, no. 102. See note above on no. 102. Specimens seen bearing the name *villosus* represent a species quite distinct from either *rattus* or *mulleri*.

Nos. 202, *firmus*, 203, *domitor*, 204, *pollens*, 205, *potens*, 206, *valens*, 207, *balmasus*, 208, *chombolis*, are all races of *R. mulleri*, no. 193.

No. 209. *Rattus maxi;* is according to Chasen a race of *infraluteus*, no. 210, which is the "high level representative of *R. mulleri*".

Nos. 211, *crassus*, 212, *sebucus*, and 213, *integer*, are all races of *R. mulleri*, no. 193.

No. 218. *Rattus marmosurus*, is probably I think a race of *R. xanthurus*, no. 216.

235. *Rattus chrysocomus; fratrorum*, no. 236, is a race, and I think it probable that most or all of the forms listed in this group will be regarded as races of *chrysocomus*.

250. *Rattus excelsior*, is I think a race of *andersoni*, no. 248.

251. *Rattus culturatus*, is very probably a race of *andersoni*, no. 248.

252. *Rattus confucianus*, and its races, will in all probability be regarded as races of *R. niviventer*, no. 264.

265. *Rattus ling*, is probably a synonym of *huang*, no. 266, according to Osgood.

266. *Rattus huang*, is a race of *R. fulvescens*, no. 267.

275. *Rattus fulvescens lepturoides*, is, according to Chasen, a synonym of no. 325, *besuki*, which Chasen lists as a race of *bukit* (= *fulvescens*), and not of *lepturus*, as it was described.

278. *Rattus ohiensis*, Phillips, Ceylon, is a thoroughly distinct species, characterized, among other things, by unusually reduced toothrow, as in *bacodon* and *alticola*, and very short palatal foramina.

No. 279. *Rattus alticola;* appears to have an unusually reduced toothrow, as in *R. baeodon.*

280. *Rattus ochraceiventer*, is a race of *alticola*, no. 279.

281. *Rattus brama;* it is possible that this represents *orbus*, no. 304.

282. *Rattus mentosus;* probably a race of *fulvescens*, no. 267.

283. *Rattus lepidus;* Chasen suggests this represents *bukit.*

284. *Rattus gracilis;* very near *orbus*, according to Chasen. It antedates *orbus.*

285. *Rattus indosinicus.* Probably a race of *cremoriventer*, no. 296.

286. *Rattus batamanus;* a race of *whiteheadi*, no. 316, according to Chasen.

287. *Rattus mandus;* a synonym of 286, *R. whiteheadi batamanus*, according to Chasen.

288. *Rattus barussanus;* a race of *cremoriventer*, no. 296, according to Chasen.

289. *Rattus hylomoides.* Chasen lists this as a race of *alticola* (no. 279), stating, however, that it is a very distinct form, and most systematists would regard it as a representative species. Toothrow apparently not specially reduced; see note above, no. 279.

290. *Rattus spatulatus;* a race of *cremoriventer*, no. 296, according to Chasen.

291. *Rattus rapit.* This is a valid species, and is used in a wide sense by Chasen, including, as races, *orbus* and *fraternus*, also *lepturus*, which, however, antedates *rapit.*

292. *Rattus trachynotus*, is queried as a synonym of *baeodon*, no. 320, by Chasen.

293. *Rattus lepcha* is very likely a race of *niviventer*, no. 264.

302. *Rattus blythi;* Chasen suggests it is a form of *bukit* (= *fulvescens*).

304. *Rattus orbus;* listed as a race (or "representative species") of *rapit*, no. 291. But cranial characters of *orbus* seem rather different from *rapit*, and nearer to *fulvescens.*

305. *Rattus orbus fraternus;* remarks as no. 304.

307. *Rattus solus;* a race of rapit, no. 291, according to Chasen.

308. *Rattus mengurus;* a race of *cremoriventer*, no 296, according to Chasen.

309. *Rattus flaviventer;* a race of *cremoriventer*, no. 296, according to Chasen.

311. *Rattus asper;* a race of *R. whiteheadi*, no. 316.

313. *Rattus klossi;* a synonym of *R. w. asper*, no. 311, according to Chasen.

314. *Rattus inas.* A race, or "representative species," of *alticola*, no. 279, according to Chasen.

315. *Rattus batus;* a race of *whiteheadi*, no. 316.

317. *Rattus whiteheadi perlutus*, is a synonym of *whiteheadi*, no. 316, according to Chasen.

318. *Rattus melinogaster*, queried by Chasen as a synonym of *whiteheadi.*

323. *Rattus lepturus.* Listed as a race of *rapit* by Chasen; but it antedates *rapit.* In any case, the very long toothrow of *lepturus* seems to suggest it is a thoroughly distinct species.

325. *Rattus lepturus besuki*, is a race of *bukit* (= *fulvescens*), according to Chasen, and not of *lepturus.*

328. *Rattus moi;* regarded as a race of *surifer*, no. 329, by Osgood.

No. 355. *Rattus pellax*, is a race of *rajah*, no. 357, according to Chasen, though the cranial characters of *pellax* seem rather distinct.

369. *Rattus catellifer*, is a race of *surifer*, no. 329.

370. *Rattus pagensis*, is a race of *R. surifer*.

371. *Rattus inflatus*, Robinson & Kloss, Sumatra, is a thoroughly distinct and highly specialized species.

Nos. 372, *perflavus*, 373, *carimatæ*, 374, *serutus*, 375, *saturatus*, 376, *ubecus*, 377, *anambæ*, and 378, *panglima*, are all races of *R. surifer*, no. 329.

No. 396. *Rattus vociferans*, and all forms here listed as races of it, are races of *R. sabanus*, no. 390.

Nos. 409, *siporanus*, 410, *soccatus*, 411, *fremens*, 412, *mansalaris*, 413, *tuancus*, 414, *balæ*, 415, *masæ*, 416, *nasutus*, 417, *luta*, 418, *stridens*, and 419, *strepitans*, are all races of *R. sabanus*, no. 390.

No. 420. *Rattus ferreocanus*, is a race of *bowersi*, no. 421.

Nos. 424, *wellsi*, 425, *mackenziei*, 426, *feæ*; all these I think are very probably races of *R. bowersi*, no. 421.

INDEX